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HANDBOOK OF THE STATISTICS OF VARIOUS TERRAIN AND WATER (ICE) BACKGROUNDS FROM SELECTED U.S. LOCATIONS.

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INFRARED AND OPTICS DIVISION

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China Lake, California

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This handbook consists of data assembled from different ERIM tasks for collecting infrared imagery on various terrain and water (ice) backgrounds in different spectral bands, and analyzing their statistical features. The descriptions are in the form of histograms, with means and standard deviations for each band, and correlations between bands; ellipse "pictures", and power spectra for various infrared spectral bands from 1 to 14 um. Various geographical locations are covered for various seasons and times of day. micrometers

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SUMMARY - HANDBOOK DESCRIPTION

The Environmental Research Institute of Michigan (ERIM) has been collecting infrared imagery with its airborne scanner for several years. Recently, ERIM has been analyzing various backgrounds for the Optical Signatures Program to derive a variety of statistical measures of interest to the designers and users of infrared systems. This handbook contains a summary of the backgrounds analyzed to date as part of this effort. Most of the backgrounds represented in this handbook were imaged on a more-or-less convenience basis, although definite plans were made to include what were considered pertinent background types. While we would be presumptuous to imply that the handbook is complete, even if that goal could be reached in the limited space of this volume, it does contain many of the components that are required to describe a variety of backgrounds.

These components are identified in part by land masses as, for example, mountains and deserts, and perhaps rain forest or jungles; by diurnal variations in background features; by seasonal variations; by scene types, such as cities or urban areas, rural areas, water masses, etc. Many of these components are included in this handbook. It is our intention to upgrade the handbook by adding to it as other data are available.

In addition to adequate geographical coverage, two other requirements demand attention for the production of useful background information: reasonable spatial resolution and adequate spectral coverage. The spatial resolution is fixed by the information capacity of what we would call general purpose, non-military imagers, such as the ERIM scanners. This criterion fixes the field-of-view of the sensor at about 2 milliradians on a side, providing a ground-print of the order of two to three feet on a side. At temperatures in the 270 [illegible] range, this provides adequate signal-to-noise ratios with the ordinary bandpass filters used in the ERIM scanners.

The filters used for the imagery in this handbook transmit in the major window regions (described below) between 1 and 15 micrometers, except that between 4.5 and 5.5 μm there can be considerable absorption by the atmosphere. We lose nothing by confining our attention to the windows, and, in fact, gain by reducing uncertainty introduced by atmospheric changes. We note often, for example, in some of the data presented in the handbook that because of the 4.5-5.5 μm spectral region dependence on the atmosphere, the divergence between the results in that spectral region and those of the spectral region between 8 and 14 μm can range from essentially zero to rather large values. The transmission characteristics of the filters used for the data in this handbook are included in Appendix A.

The scenes were chosen to depict certain geographical features, and any inhomogeneity in the scenery is a characteristic of the scene chosen. In the earlier reports of References 1 through 6, selected homogeneous areas were chosen for analysis separately. But here, the scene is kept intact with or without inhomogeneities. By comparing the thermal imagery and the greymaps, the user should easily be able to correlate features in the histograms with inhomogeneities observed in the scenery.

The calibrated (i.e., converted to radiance in watt-cm^{-2}-$sr^{-1}$$\mu m^{-1}$, or temperature in °K) signals of every pixel in the analyzed scene are digitized on magnetic tapes which are stored at the ERIM facility. We have analyzed the data in a rather general form for presentation here, but, of course, the data can be handled in any way desired. We have not formatted the tapes for automatic use by any other persons except those who have access to our special programs for computation. However, it is feasible that they could be made available to the public with far less effort than that required to obtain and analyze the data in the first place.

The substance of the handbook is compiled in Section 3, containing complete packages of background data for different locations, giving all of the statistics and pertinent environmental information. Each package is identified by the name of the scene tabulated in the Master Index and includes the following (except for minor deletions):

- Aerial photo of the scene.
- Thermal image in selected spectral regions.
- Greymap of digitized data.
- Table(s) of scene physical characteristics.
- Various statistical analyses.

The statistics include radiance and temperature histograms, with means and standard deviations; spectral correlations; ellipse "pictures" with tabulations of area, perimeter, and shape distributions; and power spectra. The statistics are described in Section 2 and the data processing details in Appendix B. Appendix A contains a description of the scanners and filters used in collecting the imagery from which the statistical information was obtained. Only those samples from the various reports of References 1 through 6, which are exemplary for a given complete set of conditions, are included. For example, the scanner can be set in two configurations, looking directly downward and looking at an angle of 35° below the horizon. The difference in results from each type of run is essentially undiscernible in most cases, meaning that the mean and standard deviation of each are nearly the same. Thus, unless the difference is significant, often only one or the other is presented.

Following this discussion is a Master Index to be used as an aid in finding information specific to the needs of the user, and corresponding to various physical and environmental conditions, geographical locations, scenery type, spectral bands, time-of-day or season, etc. Following the Master Index is a Type-of-Background Index set up in matrix form to subdivide the different background types according to the

diurnal or seasonal cycle. Finally, a Spectral Band Index is included to cover the region in the spectrum from about 1.0 μm to about 14.0 μm. The different spectral bands covered are 1.0-1.4, 1.5-1.8, 2.0-2.6, 3.0-4.2, 3.5-3.9, 4.5-5.5, and 8.0-14.0 μm. The last region, 8.0-14.0 μm, was covered with various filters at different $\Delta\lambda$'s, designated in the Index merely as 8.0-14.0 μm, but specifically delineated in the Handbook within their properly designated bands.

Since, as was mentioned earlier, the substance of this Handbook was presented in earlier reports, the reader is referred to them (cited in the individual packages) for a more thorough discussion of the statistical features of the various scenes. A few of the common formats are mentioned here, however.

- The greymaps are included to show generally the portion of the scenery analyzed.
- Each histogram includes a Gaussian curve having the same mean and standard deviation as the actual curve, and indicated by circles superimposed over the actual curve.
- The "S" on some of the histograms indicate that saturation has occurred. The digital range of the image signals is between 0 and 255. Because of the difficulty in properly setting amplifier gains, the digital range is sometimes exceeded.
- The ordinate of the power spectra is designated $(\mathrm{AMPL})^2/(1/M)$ to accommodate multiple curves with different units. For data computed in terms of spectral radiance,

$$\mathrm{AMPL} = \mathrm{watt\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}}$$

and for those computed in terms of temperature, AMPL = °K.

PREFACE

The work described herein was funded by the Optical Signatures Program to support Navy requirements. Project Monitor for this task was Dr. Jon Wunderlich, Naval Weapons Center, China Lake, California. Data from infrared (IR) imagery from various terrain and water backgrounds have been collected by the Environmental Research Institute of Michigan (ERIM), analyzed to show their statistical features, and accumulated in a handbook to present an organized set of backgrounds incorporating varied environmental parameters.

The data were collected with ERIM's multispectral scanners, which operate in several wavelength bands in the visible and infrared portions of the electromagnetic spectrum. The imagery were collected with the scanners looking both downward and in a direction 35° below the horizontal. The statistics are presented in figures and tables, as histograms, means and standard deviations, spectral correlations, ellipses, and power spectra.

In order to keep the handbook to the minimum size necessary to convey the data, and because much of the descriptive material is common to all of the reports from which the data were obtained, the authors deferred to the earlier reports (especially Reference 1) for the material of Section 2 and of Appendices A and B. However, the information essential to the utilization of the data is included in this report.

ACKNOWLEDGEMENTS

Because of the inclusive nature of the work which incorporates the substance of other tasks and resultant reports, many persons have been involved in the preparation of this handbook. Ms. Abby Liskow deserves special mention for performing the extensive computer operations necessary for the successful completion of the analyses. Dr. J. Robert Maxwell was the initial Project Manager and has contributed invaluably to this report. Dr. Robert E. Sampson has recently assumed the responsibility of Project Manager for the contract which provided the support for this report.

Finally, the most essential task of all was the collection of the data supervised by Mr. Stephen Stewart and performed by flight instrumentation specialists, Mr. Jimmie Ladd and Mr. William Juodawlkis.

The collection of data for the Camp A. P. Hill scenery was supported by the Night Vision Laboratory of the Army's Mobility Equipment Research and Development Command at Ft. Belvoir, Virginia. Data collection for Nellis AFB and Michigan, and the analysis of all the data included in this report, were supported by the Optical Signatures Program, China Lake, California.

ERIM

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MASTER INDEX

SIGNIFICANT INFORMATION ABOUT VARIOUS SCENES

Details of these scenes are to be found on the succeeding pages, which are a continuation of this Master Index.

MASTER INDEX (Cont.)

Scene: Baltimore, MD

Identifier (Date):	Baltimore (5-11-72)
Spectral Bands:	1.0-1.4, 2.0-2.6, 9.3-11.7 μm
Altitude:	2500 ft
IFOV:	2.5 mrad (cross-track); 5.0 mrad (in-track)
Aircraft Ground Speed:	
Time:	1140
Direct of Flight:	~East
Size of Analyzed Scene:	5225 x 4030 ft^2
General Description:	Residential Area
Meteorology:	Clear sky; light haze at 5 Kft; dry condition

Scene: Black Hills-1, SD

Identifier (Date):	Black Hills-1 (7-22-69)
Spectral Bands:	1.0-1.4, 2.0-2.6, 4.5-5.5, 8.0-13.5 μm
Altitude:	1500 ft
IFOV	3.5 mrad (cross-track); 6.6 mrad (in-track)
Aircraft Ground Speed:	
Time:	1340
Direct of Flight:	East
Size of Analyzed Scene:	1160 x 7140 ft^2
General Description:	Natural terrain of trees and hills with numerous shadows (forested mountains).
Meteorology:	Visibility >15 mi; clear dary, dry; cloud cover 10%

MASTER INDEX (Cont.)

Scene: Black Hills-2, SD

Identifier (Date):	Black Hills-2 (7-22-69)
Spectral Bands:	1.0-1.4, 1.5-1.8, 2.0-2.6 μm
Altitude:	1500 ft
IFOV:	3.5 mrad (cross-track); 6.6 mrad (in-track)
Aircraft Ground Speed:	200 $ft\text{-}sec^{-1}$
Time:	1340
Direction of Flight:	East
Size of Analyzed Scene:	2420 x 7200 ft^2
General Description:	Forested Mountains
Meteorology:	Visibility > 15 mi; clear day, dry; cloud cover 10%

Scene: Camp A. P. Hill, VA

Identifier (Date):	Camp A. P. Hill (3-28-78, 3-29-78, 3-30-78)
Spectral Bands:	2.0-2.6, 4.5-5.5, 8.0-14.0 μm
Altitude:	800 ft
IFOV:	2.0 mrad
Aircraft Ground Speed:	168 $ft\text{-}sec^{-1}$
Time:	0930, 1330, 1830, 2330
Direction of Flight:	West
Size of Analyzed Scene:	1100 x 1400 ft^2
General Description:	Small stands of leafless deciduous and coniferous trees.
Meteorology:	Clear and dry; sunny during daylight hours; visibility > 30 km; light haze in evening.

MASTER INDEX (Cont.)

Scene: Flint-1, MI

Identifier (Date):	Flint-1 (9-18-71)
Spectral Bands:	1.0-1.4, 1.5-1.8, 2.0-2.6, 9.3-11.7 μm
Altitude:	1000 ft
IFOV	2.5 mrad (cross-track); 5.0 mrad (in-track)
Aircraft Ground Speed:	200 $ft\text{-}sec^{-1}$
Time:	1130
Direct of Flight:	~South
Size of Analyzed Scene:	1600 x 3980 ft^2
General Description:	Residential Area
Meteorology:	Visibility >10 mi; dry; cloud cover 30-50%

Scene: Flint-2, MI

Identifier (Date):	Flint-2 (9-18-71)
Spectral Bands:	1.0-1.4, 1.5-1.8, 2.0-2.6, 9.3-11.7 μm
Altitude:	1000 ft
IFOV:	2.5 mrad (cross-track); 5.0 mrad (in-track)
Aircraft Ground Speed:	200 $ft\text{-}sec^{-1}$
Time:	1155
Direction of Flight:	Southeast
Size of Analyzed Scene:	1600 x 4430 ft^2
General Description:	Industrial-Urban Area
Meteorology:	Visibility >10 mi; dry; cloud cover 30-50%

MASTER INDEX (Cont.)

Scene: Michigan Winter Scene - City

Identifier (Date):	City (4-3-79, 4-4-79)
Spectral Bands:	3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	202 $ft\text{-}sec^{-1}$
Time:	0600, 1230, 1900, 0030
Direction of Flight:	NNW
Size of Analyzed Scene:	1650 x 1750 ft^2
General Description:	Urban Area
Meteorology:	Snow covered ground; air temperature = -2°C, 5°C, 4°C, -2°C, respectively; cloud cover = 95%, clear, 15%, 60-70%, respectively

Scene: Michigan Winter Scene - Conifers

Identifier (Date):	Conifers (4-3-79, 4-4-79)
Spectral Bands:	3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression);
IFOV:	2.5 mrad
Aircraft Ground Speed:	202 $ft\text{-}sec^{-1}$
Time:	0600, 1230, 1900, 0030
Direction of Flight:	NNW
Size of Analyzed Scene:	1650 x 1750 ft^2
General Description:	Coniferous Forest
Meteorology:	Snow covered ground; air temperature = -2°C; cloud cover = 95%, clear, 15%, 60-95%, respectively

MASTER INDEX (Cont.)

Scene: Michigan Winter Scene - Farmland

Identifier (Date):	Farmland (4-3-79, 4-4-79)
Spectral Bands:	3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	202 ft-sec^{-1}
Time:	0600, 1230, 1900, 0030
Direction of Flight:	NNW
Size of Analyzed Scene:	1650 x 1750 ft^2
General Description:	Farm Fields
Meteorology:	Snow covered ground; air temperature = -2°C, 5°C, 4°C, -2°C, respectively; cloud cover = 95%, clear, 15%, 60-95%, respectively

Scene: Michigan Winter Scene - Land and Water

Identifier (Date):	Land and Water (4-3-79, 4-4-79)
Spectral Bands:	3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	202 ft-sec^{-1}
Time:	0600, 1230, 1900, 0030
Direction of Flight:	NNW
Size of Analyzed Scene:	1650 x 1750 ft^2
General Description:	Land and Lake
Meteorology:	Snow covered ground; air temperature = -2°C, 5°C, 4°C, -2°C, respectively; cloud cover = 95%, clear, 15%, 60-95%, respectively

MASTER INDEX (Cont.)

Scene: Mill Creek, OK

Identifier (Date):	Mill Creek (6-30-72)
Spectral Bands:	1.0-1.4, 1.5-1.8, 2.0-2.6, 9.3-11.7 μm
Altitude:	3000 ft
IFOV:	2.5 mrad (cross-track); 5.0 mrad (in-track)
Aircraft Ground Speed:	200 $ft\text{-}sec^{-1}$
Time:	0730
Direction of Flight:	Southeast
Size of Analyzed Scene:	3990 x 4840 ft^2
General Description:	Mountainous Terrain
Meteorology:	Visibility 30 mi; dry; cloud cover 30%

Scene: Mono Lake, CA

Identifier (Date):	Mono Lake (9-23-68)
Spectral Bands:	1.0-1.4, 2.0-2.6, 4.5-5.5, 8.0-13.5 μm
Altitude:	4000 ft
IFOV:	3.5 mrad (cross-track); 6.6 mrad (in-track)
Aircraft Ground Speed:	200 $ft\text{-}sec^{-1}$
Time:	1000
Direction of Flight:	South
Size of Analyzed Scene:	3100 x 6760 ft^2
General Description:	Mountains
Meteorology:	Visibility >15 mi; clear and bright; dry

MASTER INDEX (Cont.)

Scene: Nellis AFB, NV - Desert and Dry Lake

Identifier (Date):	NEV-C,L H1 (2-25-78, 2-26-78)
Spectral Bands:	2.0-2.6, 3.0-4.2, 3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	200 ft-sec^{-1}
Time:	1100, 1600
Direction of Flight:	East, except NEVC (West)
Size of Analyzed Scene:	1750 x 2700 (desert); 1750 x 1350 (dry lake)
General Description:	Desert and Dry Lake
Meteorology:	1100 - high, thin, scattered clouds, visibility = 15 miles; 1600 - scattered clouds, light haze, visibility = 35 miles

Scene: Nellis AFB, NV - Mountains

Identifier (Date):	NEV-B, F, I, M, N, G1 (2-25-78, 2-26-78)
Spectral Bands:	2.0-2.6, 3.0-4.2, 3.5-3.9, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	200 ft-sec^{-1}
Time:	0930, 1100, 1500
Direction of Flight:	East, except NEVG1 (West)
Size of Analyzed Scene:	1750 x 6750 ft^2
General Description:	Mountains
Meteorology:	0930 - high, thin, scattered clouds, 1100 - visibility = 15 miles; 1500 - scattered clouds, light haze, visibility = 35 miles

MASTER INDEX (Concluded)

Scene: Pisgah Crater, CA

Identifier (Date):	Pisgah Crater (10-30-70)
Spectral Bands:	8.0-10.9, 9.4-12.1, 11.3-13.5 μm
Altitude:	1000 ft
IFOV:	3.5 mrad (11.3-13.5); 21 x 28 $mrad^2$ (8.0-10.9, 9.4-12.1)
Aircraft Ground Speed:	
Time:	0830
Direction of Flight:	South-Southeast
Size of Analyzed Scene:	6960 x 820 ft^2
General Description:	Mountains
Meteorology:	Visibility 50 mi; clear and bright; dry; cloud cover 10%

Scene: Port Hueneme, CA

Identifier (Date):	HUME1 (or HUM1) HUME2 (or HUM2) (3-7-78)
Spectral Bands:	2.0-2.6, 3.0-4.2, 4.5-5.5, 9.0-11.4 μm
Altitude:	1000 ft (35° depression); 1750 ft (90° depression)
IFOV:	2.5 mrad
Aircraft Ground Speed:	202 $ft\text{-}sec^{-1}$
Time:	1215, 1420
Direction of Flight:	West
Size of Analyzed Scene:	6350 x 2800 ft^2 (HUME1) 1800 x 900 ft^2 (HUME2)
General Description:	Land and water; port facility
Meteorology:	Visibility >15 mi; slight haze; high scattered clouds; water calm; slight rolling waves

TYPE-OF-BACKGROUND INDEX

This index is intended to direct the reader to background data compiled for different types of scenes and under different temporal conditions, diurnal and seasonal. The breakdown of data into more detailed categories was considered unnecessary because the physical and environmental characteristics are tabulated in each data package in Section 3.

In this index there is a time-of-day versus season matrix for each type of background scene. The reader is referred to the Master Index for the location in the Handbook of material pertinent to the referenced background type.

RESIDENTIAL-INDUSTRIAL

Season	Time (Hrs.)			
	0001-0600	0601-1200	1201-1800	1801-2400
Jan.-Mar.	Michigan	Michigan	Michigan Port Hueneme, CA	Michigan
Apr.-June		Baltimore, MD		
July-Sept.		Flint, MI		
Oct.-Dec.				

MOUNTAINS

Season	Time (Hrs.)			
	0001-0600	0601-1200	1201-1800	1801-2400
Jan.-Mar.		Nellis AFB, NV	Nellis AFB, NV	
Apr.-June		Mill Creek, OK		
July-Sept.		Mono Lake, CA	Black Hills, SD	
Oct.-Dec.		Pisgah Crater, CA		

DESERT

Season	Time (Hrs.)			
	0001-0600	0601-1200	1201-1800	1801-2400
Jan.-Mar.		Nellis AFB, NV	Nellis AFB, NV	
Apr.-June				
July-Sept.				
Oct.-Dec.				

WATER (ICE)

Season	Time (Hrs.)			
	0001-0600	0601-1200	1201-1800	1801-2400
Jan.-Mar.	Michigan	Michigan	Michigan Port Hueneme, CA	Michigan
Apr.-June				
July-Sept.				
Oct.-Dec.				

VEGETATION-RURAL

Season	Time (Hrs.)			
	0001-0600	0601-1200	1201-1800	1801-2400
Jan.-Mar.	Camp A.P. Hill, VA Michigan	Camp A.P. Hill, VA Michigan	Camp A.P. Hill, VA Michigan	Camp A.P. Hill, VA Michigan
Apr.-June				
July-Sept.			Black Hills, SD	
Oct.-Dec.				

SPECTRAL BAND INDEX

1.0-1.4 μm

Flint-1
Flint-2
Baltimore
Mill Creek
Black Hills-1
Black Hills-2
Mono Lake

1.5-1.8 μm

Flint-1
Flint-2
Mill Creek
Black Hills-2

2.0-2.6 μm

Flint-1
Flint-2
Baltimore
Mill Creek
Black Hills-1
Black Hills-2
Mono Lake
Nellis AFB
Port Hueneme-1
Port Hueneme-2
Camp A.P. Hill
Michigan

3.0-4.2 μm

Nellis AFB
Port Hueneme-1
Port Hueneme-2

3.5-3.9 μm

Nellis AFB
Michigan

4.5-5.5 μm

Black Hills-1
Mono Lake
Nellis AFB
Port Hueneme-1
Port Hueneme-2
Camp A.P. Hill
Michigan

8.0-14.0 μm

Flint-1
Flint-2
Baltimore
Mill Creek
Black Hills-1
Pisgah Crater
Mono Lake
Nellis AFB
Port Hueneme-1
Port Hueneme-2
Camp A.P. Hill
Michigan

1
DATA ANALYSIS - INTRODUCTION

For a large number of years, there has been a great demand for statistical information on backgrounds to be used in a variety of ways, in particular as input to the design and analysis of infrared systems. The Environmental Research Institute of Michigan (ERIM) has for years been collecting infrared imagery with its airborne scanners, calibrated to yield, absolutely, spatially varying radiances from chosen scenery with relatively high spatial resolution. Recent flights have been sponsored through the Optical Signatures Program to Support Navy Requirements. One scanner and its associated equipment are described in Appendix A.

A variety of statistical measures have been derived from the imagery and are presented in this handbook. These include the conventional statistical parameters of means, standard deviations, histograms, Wiener (power) spectra, and spectral correlations as well as new area/radiance/temperature statistics which are particularly relevant in view of recent advances in sensor and processor technology. Efforts to assess the utility of the various background statistical measures have been reported in various technical reports (References 1-6).

Conventional background statistics have in the past been adequate since in many instances there is a high contrast between the target and background. In such instances, the highest intensity background points determine the highest threshold setting necessary to eliminate all false alarms and the histograms provide estimates of how the detection probability and false alarm rate vary with threshold setting. However, today there is a need for higher-order background statistics because of the increased sophistication of background rejection techniques employed with large detector arrays and imaging or scanning sensors.

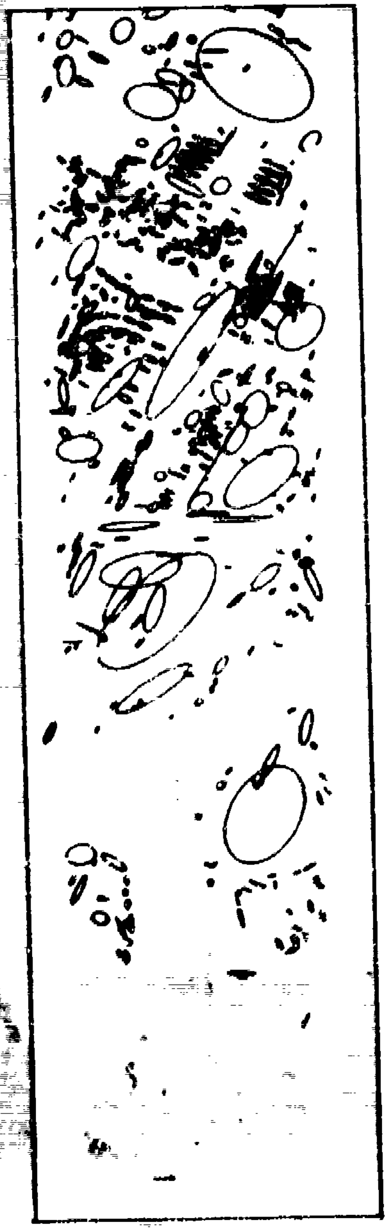
Although the power spectrum is a background statistic which does vary with the spatial distribution of radiances in the scene, it is clearly an inadequate background descriptor for most of today's problems. Small areas of high radiance produce most of the false alarms in today's sensors, and the power spectrum does not distinguish between scenes with many low-intensity areas and those with a few high-intensity areas. This is a well known fact and a result which is evident from the background modeling work of R. Clark Jones and the Working Group on Infrared Backgrounds, WGIRB (Reference 7).

Hence, in addition to the conventional statistics on terrain backgrounds, area/radiance/temperature statistics have been developed as a statistical measure that is more directly useful to the sensor designer in estimating detection probabilities and false alarm rates with today's sensor and processor technology. The statistics developed are the probabilities that regions (of various sizes, shapes, and orientations) will occur in the scene above a specified radiance threshold. The parameters calculated are area, major and minor axes, and the angular orientation for an elliptical figure that is equivalent, in geometric area and ratio of second moments of the region area about its centroid, to each contiguous region above the radiance threshold. The elliptical area is equivalent in spatial area only to each contiguous region above the radiance threshold. Presented in the handbook are histograms of the number of area sizes occurring above preselected thresholds. For most scenes, the number of regions and their areas decrease as the threshold is raised, while the number of small regions above any preset threshold varies from one scene to the next. These area/radiance/temperature statistics are analogous to the more familiar pulse length statistics for one-dimensional records.

The statistical parameters for the occurrence of areas and intensities in the various background scenes are not only directly useful for estimating sensor performance but may also be useful in special cases in simulating classes of backgrounds. The equivalent ellipses at each threshold can be positioned to simulate the actual scene from which they were derived, or repositioned at random to simulate many scenes having the same area/radiance/temperature statistics. Such simulations of backgrounds reproduce many of the spatial characteristics of the original scene as is shown by example in Figure 1. In this figure, a sample thermal image is reproduced, overlaid by a transparency containing ellipses processed in the analysis from a preselected threshold. Correlations between the ellipses and certain structures in the imagery are evident. The correlations are not as spectacular, however, in the more homogeneous backgrounds. The statistics of the ellipses should match the real scene statistics more and more closely as the threshold for signal detection is raised. However, we have not performed a complete analysis of the correlation between scene characteristics and the simulations representing these scenes.

The histograms provide probably the greatest amount of information in general about the scene. In the thermal regions of the spectrum they are presented in terms of temperature for comparison among the different spectral regions. The temperatures are obviously only apparent since the emissivity of the surface is less than unity, and furthermore, the atmosphere intervenes to alter the radiation emitted by the surface. Inhomogeneities in the surface radiative properties tend to spread the histogram, while the atmosphere tends to have a quieting effect. The interplay of these two characteristics is evident in the different scenes, particularly in a comparison between the 4.5-5.5 μm and the 8.0-14.0 μm regions. In the shorter wavelength regions, the sun's influence is evident.

FIGURE 1. ELLIPSE MATCH WITH IMAGERY



The scanner details are included in Appendix A and the data processing procedures are presented in Appendix B. The remaining sections of this handbook contain the background data that forms the substance of this handbook. The type of data included in this handbook and the form of data presentation is described in Section 2. This section provides the data description and explanation necessary for utilizing the handbook. The substance of the handbook is compiled in Section 3, containing complete packages of background data and pertinent environmental information.

2
DESCRIPTION OF DATA STATISTICS

The multispectral background data selected for inclusion in this report were analyzed to determine the statistics of both radiometric and spatial features. The general data processing principles are presented in Section 2.1 with a more detailed discussion of the procedures included in Appendix B. The remainder of this section is devoted to describing the data and the statistics used to present the data in this handbook. The statistical measures derived from the data are described in Section 2.2; point statistics in Section 2.2.1, and correlative statistics in Section 2.2.2. Three types of correlative statistics are discussed. These include spectral correlations between pairs of bands; area/radiance/temperature statistics and the development of the equivalent elliptical area concept; and one-dimensional Wiener (power) spectra.

2.1 DATA PROCESSING PROCEDURE

Some preprocessing is required before the scanner data are used to generate scene statistics. First, the high density digital tapes must be converted to computer compatible tapes. Secondly, each channel must be calibrated in temperature or radiance (see Appendix B.2). The data in the near IR channel are converted to equivalent radiance in $\mu W/cm^2 \cdot sr \cdot \mu m$ and the data in the thermal IR channels are converted to apparent temperature in degrees Kelvin. Next, averaging is employed to reduce oversampling and to equalize any differences in the fields of view of the various detectors (see Appendix B.3). Lastly, calibrated formatted tapes are generated for analysis.

2.2 STATISTICS DEFINITIONS

Several sets of statistics have been generated for each of the chosen scenes. These may be broken down into two groups:

1. Point Statistics: Those defined by individual data points in a single channel.

2. Correlative and Area Statistics: Those requiring calculation of correlation effects for a scene either in a single channel or between channels.

2.2.1 POINT STATISTICS: MEANS AND STANDARD DEVIATIONS

The point statistics generated are the mean and standard deviation for each channel and a histogram of the data value distributions of these channels. In some imagery, to determine the degree of homogeneity that exists, the total scene is broken down into sub-areas and the point statistics generated for these sub-areas as well as for the total area. In practice, the sub-area statistics are generated first and the total area statistics derived from them. Sub-areas are not included in this handbook.

The mean value for area η in Channel J ($\overline{X(J)_\eta}$) is evaluated using

$$\overline{X(J)_\eta} = \frac{1}{N_\eta} \sum_{i=1}^{N_\eta} x(J)_i \tag{2-1}$$

where $x(J)_i$ is the data value of pixel i in Channel J and N_η is the total number of data points in the area. Using the same notation, the standard deviation, $\sigma^2(J)_\eta$, is given by

$$\sigma^2(J)_\eta = \left(\frac{N_\eta}{N_\eta - 1}\right)\left\{\left(\frac{1}{N_\eta} \sum_{i=1}^{N_\eta} x^2(J)_i\right) - \overline{x(J)_\eta^2}\right\} \tag{2-2}$$

At the same time that these statistics are generated, the number of data points having each of the possible data values (0 to 255) is tabulated and this tabulation used to generate histograms for the scene.

A representative histogram is included in Figure 2. Note that the ordinate of the histogram is probability expressed as fraction of the total number of data points within an interval of the abscissa. In this example case, it is the fraction of the total in a 0.19°K interval.

2.2.2 CORRELATIVE AND AREA STATISTICS

Three sets of correlative statistics are generated for the scenes: wavelength correlations, area statistics, and spatial correlations or Wiener spectra. Because of the common factors involved, the wavelength correlations are evaluated at the same time as the means and standard deviations while the area statistics and Wiener spectra require separate computer codes.

2.2.2.1 Wavelength Correlations

The wavelength correlations are determined for all pairs of channels except for those collected at opposite ends of the M-5 scanner which were 90° out of phase. The data for the 1.0-1.4, 1.5-1.8, and 2.0-2.6 μm channels were collected using a three-element InAs detector, the segments of which look at slightly different ground areas at any given time. The 1.0-1.4, 2.0-2.6, and 4.5-5.5 μm data were collected with a three-element InSb detector. The three channel data were brought into registration at the nadir by applying appropriate time delays to the leading channels (time delays long enough to correct for the 90° phase difference between the two ends of the M-5 scanner could not be generated). Complete registration could not be maintained across the entire scan line because as the scan angle is increased, the projection of the three detector arrays rotates about the center element until at a scan angle of 90° the detector array is aligned in-track rather than cross-track. However the element-to-element registration is 50% or better for angles $\pm 20°$ of nadir.

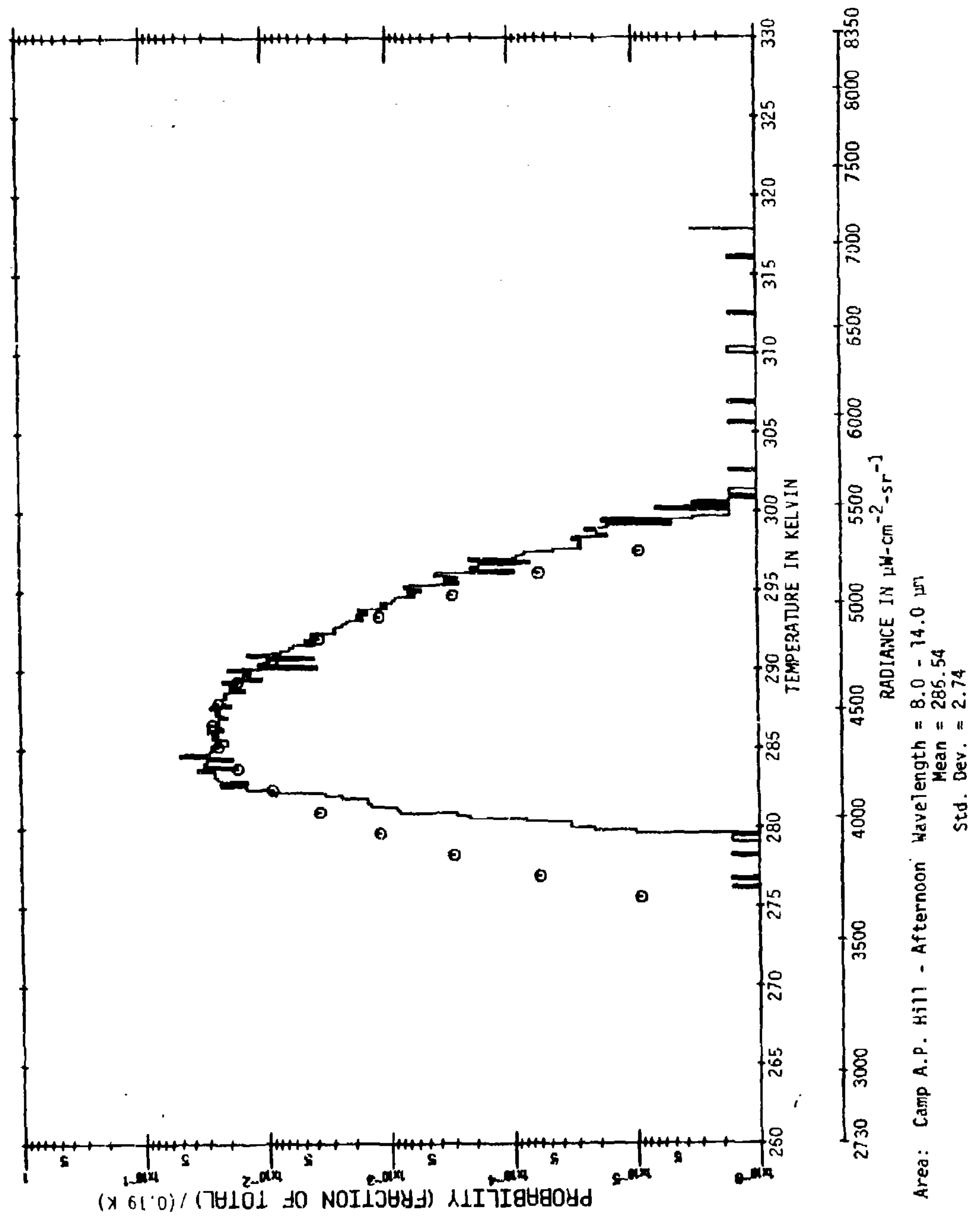


FIGURE 2. CAMP A.P. HILL - AFTERNOON

The wavelength correlation between two channels, J and K, is defined in terms of a correlation coefficient which is the ratio of the covariance of the two channels to the product of their standard deviations:

$$\mathrm{COR}(J,K) = \frac{\mathrm{COV}(J,K)}{\sigma(J)\sigma(K)} \qquad (2\text{-}3)$$

where COR(J,K) is the correlation coefficient for the two channels, $\sigma(J)$ and $\sigma(K)$ their standard deviations, and COV(J,K), the J-K element of the covariance matrix for a given area, is defined as

$$\mathrm{COV}(J,K)_\eta = \frac{N_\eta}{N_\eta - 1}\left\{\frac{1}{N_\eta}\sum_{i=1}^{N_\eta} x(J)_i x(K)_i - \overline{x(J)_\eta}\;\overline{x(K)_\eta}\right\} \qquad (2\text{-}4)$$

where all symbols are the same as those of Equations 2-1 and 2-2. The reason for the simultaneous evaluation of Equations 2-2 and 2-4 is obvious: the square of the standard deviation $\sigma^2(J)$ is the autocovariance or the covariance of a given channel with itself COV(J,J). An example of the correlation coefficients for the infrared channels of the sample area is given in Table 1.

2.2.2.2 Area/Radiance/Temperature Statistics

Since means, standard deviations, and histograms do not give any information about the positions of data values in the scene or possible clustering of these values, area statistics have been generated by determining contiguous regions of the scene for which the enclosed points had values greater than some prescribed threshold. Once these regions have been defined, their geometric centroids, areas, and second moments are determined and these parameters used to define a set of equivalent elliptical areas. The output from this procedure is, for each threshold level, a tabulation of distributions in terms of area, perimeter, and shape of the pictured ellipses.

TABLE 1. STATISTICS OF THE AFTERNOON SCENE

Number of Subregions = 1

Pixel Subarea* Divisions at: 1 855

Line Subarea* Divisions at: 1 704

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (2.0 - 2.6 μm)
4 (4.5 - 5.5 μm)
5 (8.0 - 14.0 μm)

Correlation	2	4	5
2	1.000		
4	0.782	1.000	
5	0.636	0.882	1.000

Channels	2	4	5
Mean	6.2356E+01	2.8569E+02	2.8654E+02
St. Dev.	2.4785E+01	2.2922E+00	2.7390E+00
Total Points	597800.	597800.	597800.

*The term subarea refers to the original analyses in which the total area was subdivided into subareas. In the handbook samples, subarea and total area are equivalent. The line and pixel numbers are evident from the greymap dimensions.

The semi-major and semi-minor axes of the equivalent ellipses are taken coincident with the principal axes of the regions they represent. If I_x^c and I_y^c are the second moments of a region about the centroid and I_{xy}^c its product moment, all of which are calculated as if the plane figures are massive and have moments of inertia*, the angle of rotation of the principal axes relative to a fixed x-y coordinate system is given by

$$\alpha = \frac{1}{2} \tan^{-1} \left\{ \frac{2\, I_{xy}^c}{I_y^c - I_x^c} \right\} \tag{2-5}$$

where α is in radians. The second moments of the region about the principal axes are then given by

$$I_{x'} = \left(\frac{I_x^c + I_y^c}{2}\right) + \left(\frac{I_x^c - I_y^c}{2}\right) \cos 2\alpha - I_{xy}^c \sin 2\alpha$$

and (2-6)

$$I_{y'} = \left(\frac{I_x^c + I_y^c}{2}\right) - \left(\frac{I_x^c - I_y^c}{2}\right) \cos 2\alpha + I_{xy}^c \sin 2\alpha$$

Since the area and the second moments of an arbitrary region cannot be simultaneously matched using an ellipse, equality is demanded between the geometric areas and the <u>ratios</u> of the principal moments. If the semi-major and semi-minor axes of the ellipse are defined as a and b, respectively, and the a-axis is aligned with the larger of the principal axes of the region, these equalities give

$$a^2 = \frac{A}{\pi} \sqrt{\frac{I_1}{I_2}} \tag{2-7}$$

and

$$b^2 = \frac{A}{\pi} \sqrt{\frac{I_2}{I_1}}$$

*cf. Mathematical Statistics, S. S. Wilks, John Wiley & Sons, 1962.

where A is the area of the region and I_1 and I_2 are the moments given by Equation 2-6, with $I_1 > I_2$. If $I_{y'}$ of Equation 2-6 is the larger of the moments, the a-axis of the ellipse is oriented at an angle α with respect to the fixed x-axis; if $I_{x'}$ is larger, the a-axis is at an angle $\alpha + \pi/2$. An example of the equivalent elliptical areas generated for the 8.0-14.7 μm channel of the sample area is shown in Figures 3 and 4. These figures represent the areas found for data values exceeding the specified threshold where σ is the standard deviation, i.e., 2.74°K, and the threshold is defined as the mean plus the specified multiple of σ. The mean is 286°K.

2.2.2.3 Wiener (Power) Spectra

The last of the correlative statistics generated are Wiener spectra which give information about the spatial frequency content of the images. The Wiener spectrum for a stationary process is defined as the Fourier transform of the autocorrelation function. In one dimension this is

$$S(k_x) = \int_{-\infty}^{\infty} \exp\,(-2\pi i k_x x) R(x)\, dx \qquad (2\text{-}8)$$

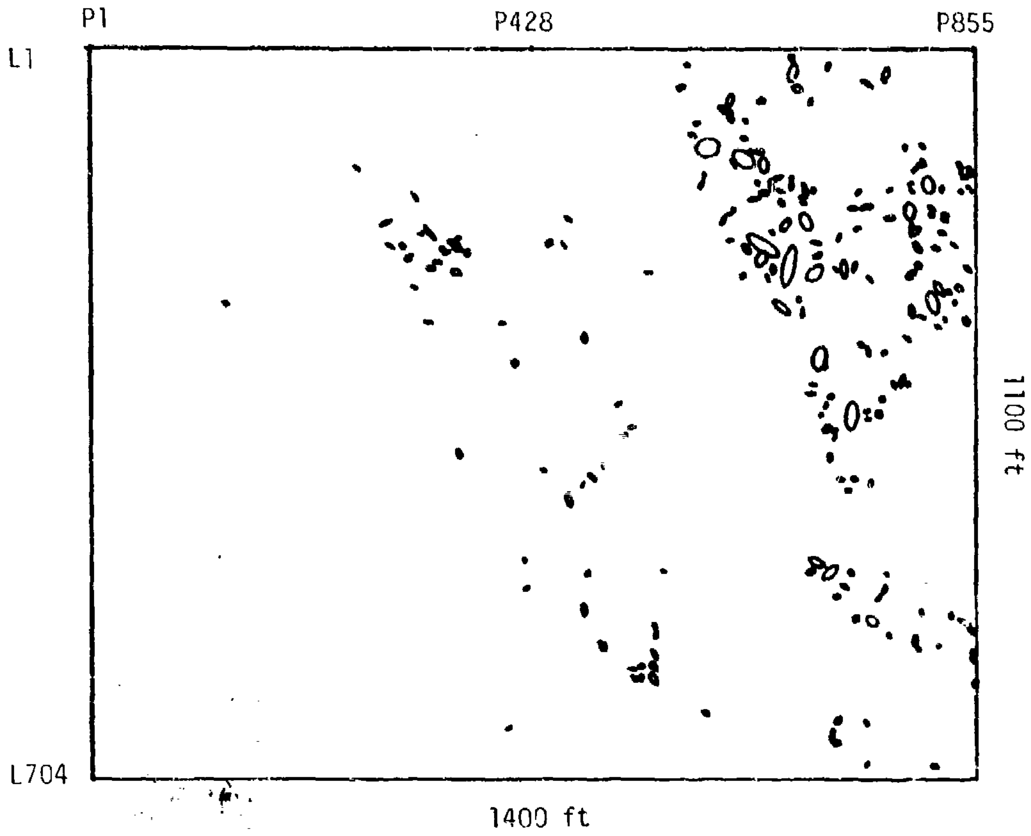
where $S(k_x)$ is the Wiener or power spectrum, k_x the spatial frequency, and R(x) the autocorrelation function. R(x) is itself defined as the expectation value of the product of scene data values times the corresponding values for the scene when displaced by x:

$$R(x) = E\,\{f(X)f(X + x)\} \qquad (2\text{-}9)$$

where E represents the expectation value of the argument. The Wiener spectrum may be evaluated without first determining the autocorrelation function if the integral

$$\int_{-\infty}^{\infty} |xR(x)|\, dx \qquad (2\text{-}10)$$

is bounded, which is usually the case for non-periodic data with zero mean. In this case, it may be shown that [Reference 8]



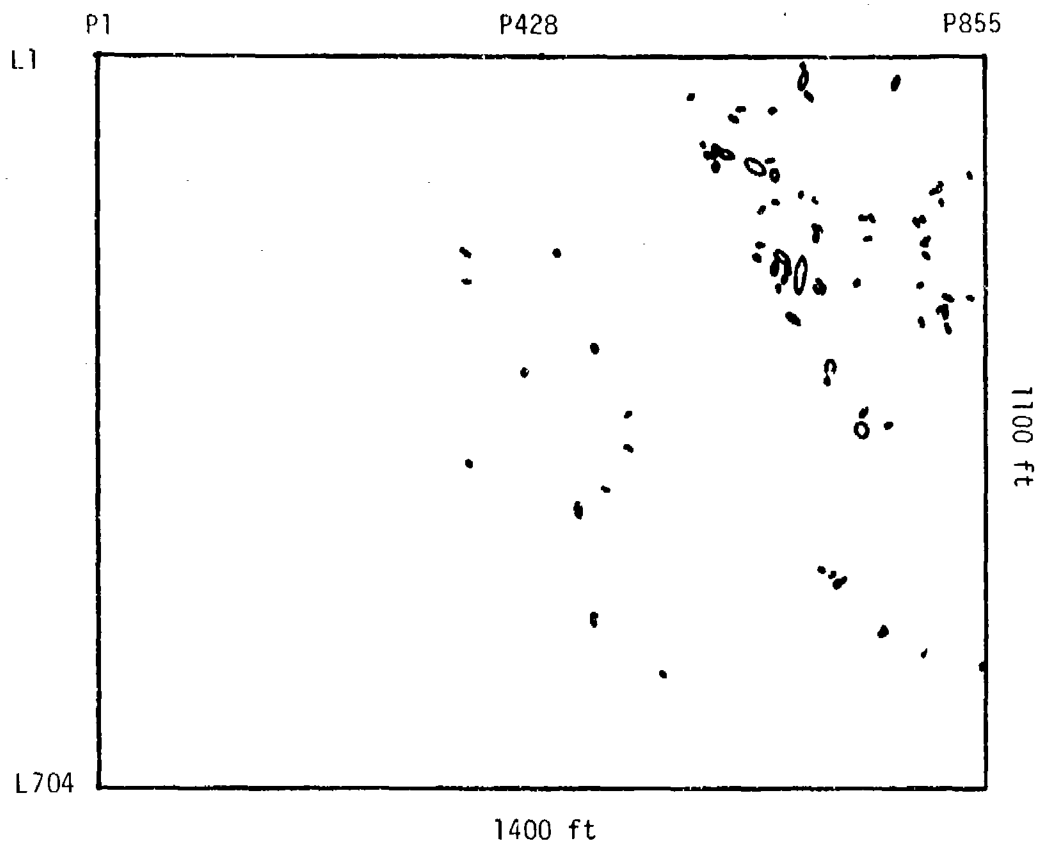
Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 286.54 Kelvin

Std. Dev. = σ = 2.74 Kelvin

FIGURE 3. EQUIVALENT ELLIPTICAL AREAS - AFTERNOON



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 286.54 Kelvin
Std. Dev. = σ = 2.74 Kelvin

FIGURE 4. EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

$$S(k_x) = \lim (x_2 - x_1)\to\infty \left| \int_{x_1}^{x_2} f(x)\, \exp(-2\pi i k_x x) dx \right|^2 \qquad (2\text{-}11)$$

so that the Wiener spectrum is, in the limit, the modulus squared of the Fourier transform of the scene. Written in terms of the discrete Fourier transform, this equation becomes

$$S(j) = \frac{\Delta x}{(N - 1)} \left| \sum_{\ell=0}^{N-1} f(\ell)\, \exp(-2\pi i j \ell / N) \right|^2 \qquad (2\text{-}12)$$

where N is the total number of points being transformed, i the square root of -1, and the spatial frequency k_x, evaluated only at integer values of j, is given by

$$k_x = \frac{j}{N\Delta x} \qquad (2\text{-}13)$$

where x is the displacement between successive data points.

It may be seen from Equation 2-12 that the Wiener spectrum S(j) is symmetric about j=N/2 since

$$\exp(-2\pi i(N-j)\ell/N) = \exp(+2\pi i j \ell/N) \qquad (2\text{-}14)$$

Hence

$$S(N-j) = S(j) \quad \text{for} \quad j=1,\ 2,\ \ldots,\ N/2 \qquad (2\text{-}15)$$

and only the first half of the Wiener spectrum needs to be evaluated. The calculated frequency range is then

$$\frac{1}{N\Delta x} \le k_x \le \frac{1}{2\Delta x} \qquad (2\text{-}16)$$

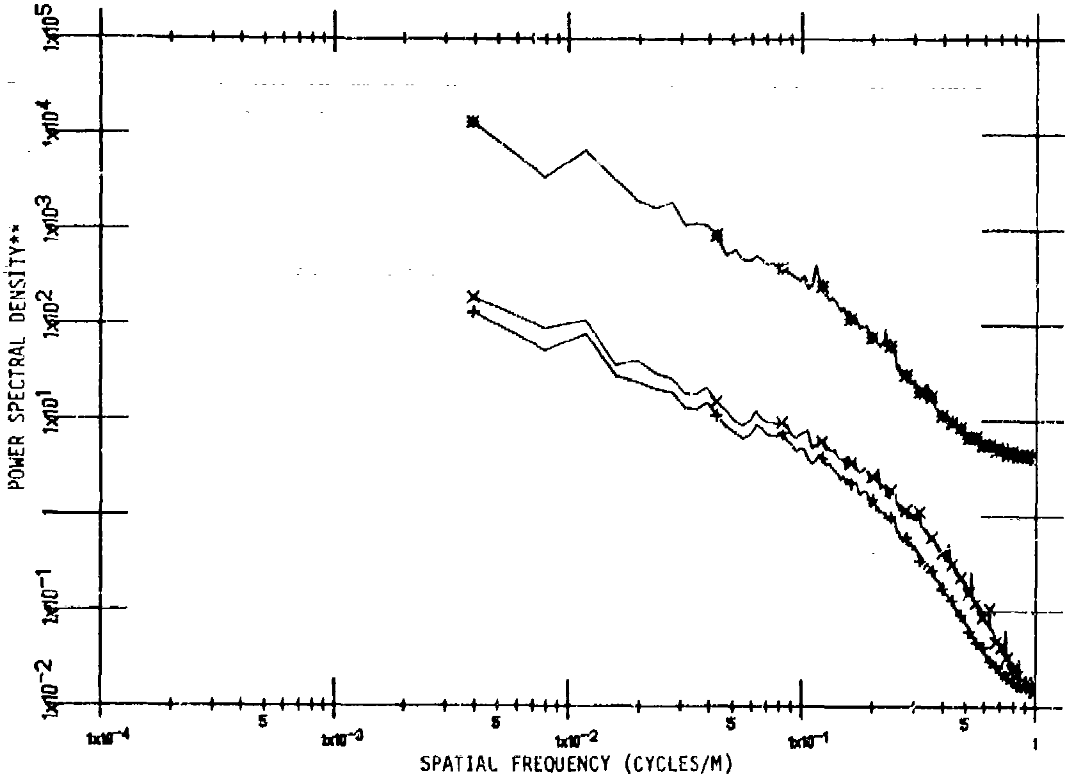
One-dimensional Wiener spectra are evaluated both cross-track (along scan line) and in-track (parallel to the aircraft flight paths). These are average spectra since Equation 2-12 was used to transform individual "lines" of data and the transforms have been averaged over a number of

"lines". Since the Fourier transform algorithms are substantially less expensive if the number of points transformed is a power of 2, only 2^n points (n was mostly 9, so 2^n=512) are used for both the cross-track and in-track "lines" of data. The middle 512 scan lines are averaged to obtain the cross-track Wiener spectra; a number of along-track lines (usually 25) equally spaced across the image are averaged to obtain the in-track Wiener spectra. Examples of in-track and cross-track Wiener spectra for the sample area are shown in Figures 5 and 6. The units of power density are $(°K)^2$/cycle per meter for the bands above 3 μm and $(\mu W/cm^2 \cdot sr \cdot \mu m)^2$/cycle per meter for the bands below 3 μm.

Because of the multi-modal nature of many of the background scenes, Wiener spectra are limited, as mentioned in Section 1, in their description of false alarms. They are, however, a traditional method of producing spatial phenomena mathematically, and show trends which are helpful in an overall appraisal of a background scene, especially in relation to other scenes.

2.3 DATA UTILIZATION

The data co..ained in Section 3 were collected over a period of several years for a variety of purposes. There exists a variety of problems to which data of this type are directly applicable. In some cases, data may be completely appropriate (right wavelength, time, etc.) to a particular problem. While in other situations, it will be desirable to use the data included herein for problems for which the measurements are not directly analogous. For these cases, an estimate may be obtained by extrapolation from or interpolation between the data packages of Section 3. For example, estimates of the background characteristics at wavelengths other than the precise wavelengths at which the measurements were made are possible using the filter characteristics of the scanner included in Appendix A and considering atmospheric effects. In the thermal bands, blackbody curves should be used to extrapolate to the wavelength of interest, whereas in the near infrared wavelengths, the solar spectrum is used.

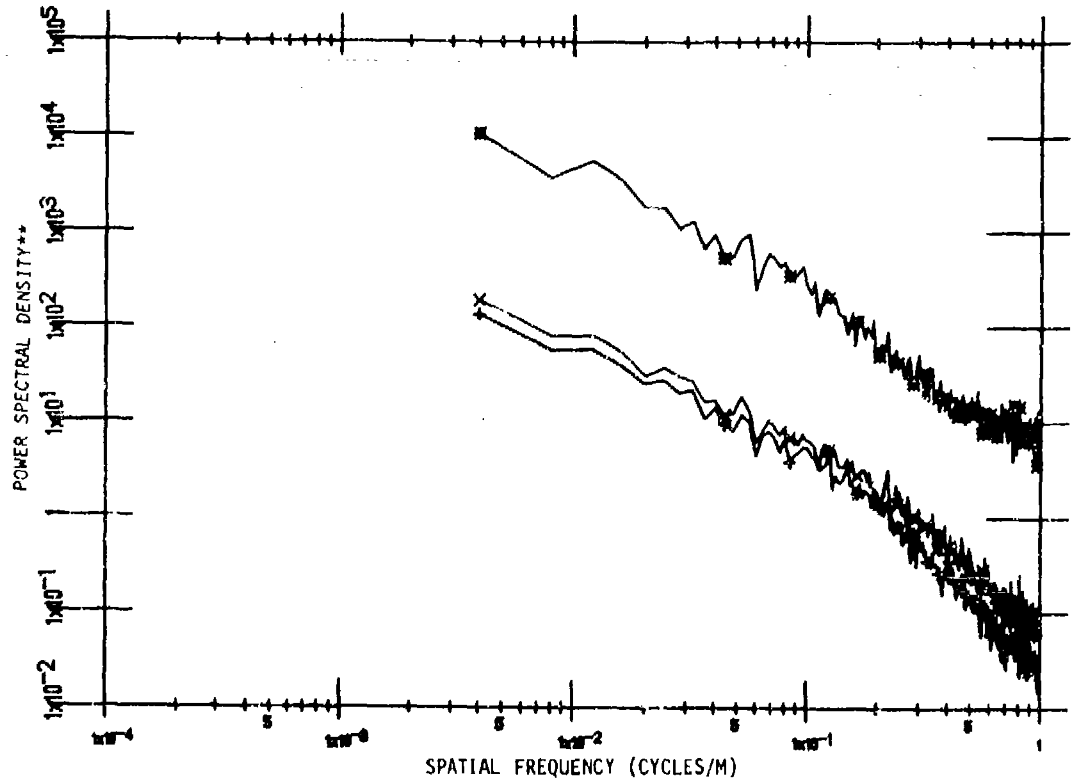


Area: CAMP A.P. HILL CROSS-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - AFTERNOON

**Power spectral density is ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.

FIGURE 5. POWER SPECTRA - AFTERNOON (CROSS-TRACK)



Area: CAMP A.P. HILL IN-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - AFTERNOON

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.

FIGURE 6. POWER SPECTRA - AFTERNOON (IN-TRACK)

In both cases, the variation in the scene emissivity and reflectivity with wavelength will introduce some uncertainty. Additionally, detailed atmospheric measurements were not made and some uncertainty will exist due to atmospheric effects. However, if one recognizes the uncertainties involved due to these effects, an estimate of the background characteristics at conditions other than those included in Section 3 is feasible. The accuracy of the estimate will depend on both the closeness of desired data conditions to those included herein and the specific background and conditions from which the interpolation is made.

3
PHYSICAL DESCRIPTIONS AND STATISTICAL DATA FOR VARIOUS SCENES

This Section is composed of data packages from the different scenes from which imagery was obtained under various environmental, diurnal, and seasonal conditions. Each package contains the following in this order.

1. Tables giving the pertinent environmental, geographical, and temporal data concerning the scene; and physical data on the area of coverage, spectral coverage, spatial resolution, flight direction, and depression angle (from the horizontal) of the scanner look direction.

2. Aerial photograph of the scene.

3. Scanner imagery of the scene in various spectral bands.

4. Greymaps of the imagery in selected spectral bands, designating the chosen areas of coverage for which the statistics were calculated. Scanner line numbers are shown on the side of the map and pixel numbers in the scan line on the top or bottom. Scanner line and pixel numbers are used to identify the location of the data in the imagery. See Appendix B for additional details. Because of vertical-to-horizontal asymmetry of scale in the line printer which creates the greymaps, picture sizes are not to scale. The dimensions and scanner line and pixel numbers are included on the picture to identify the area represented.

5. Histograms of selected portions of the imagery showing temperature and/or radiance distributions of scene elements (pixels) for various spectral bands. Histograms are reported as probability expressed as fraction of data points in a temperature interval as a function of temperature for wavelengths above 3 μm and as fraction of data points in a radiance interval as a function of radiance for wavelengths below 3 μm.

6. Tables showing means and standard deviations for various spectral bands, along with correlations of the data between pairs of spectral bands. The total number of points (pixels) to which these values correspond are tabulated.

7. Selected ellipse statistics in two forms: distributions of ellipses in terms of area, perimeter, and shape factor*, and actual ellipses "pictures" representing the events from which the ellipses were calculated. See Section 2 for description of ellipse representations. In the ellipse pictures, the scanner line numbers corresponding to those on the greymaps are prefixed with an "L"; the pixel numbers are prefixed with a "P". Thus, line 50 is L50, pixel 75 is P75.

In some cases one will note a discrepancy between the number of ellipses tabulated in the "Distribution" table which follows each ellipse picture and the apparent number of ellipses in the corresponding figure. There are several reasons for these occurrences among which the following are the chief ones. When obvious, glaring noise spikes were encountered, they were erased from the pictures, but were nevertheless tabulated by the computer program. This occurred only in two cases which are designated on the appropriate figures and tables. Another cause is the merging of small ellipses which appear as one. Finally, probably the major cause is the fact that the Calcomp plotting routine apparently simply drops ellipses which are below a certain size. Therefore, when this discrepancy occurs, it happens mainly to the smallest values in the tabulation, which covers no more than a half dozen pixels

*Shape Factor $= \dfrac{\text{Perimeter}/2\pi}{(\text{area}/\pi)^{1/2}}$

For a circular area, the shape factor would achieve its minimum value of unity.

or so. Since the tapes containing the analyzed data can be made available at cost, these minutely detailed results can be retrieved by persons interested in them.

8. One-dimensional power (Wiener) spectra, both in the direction of flight and across the flight line, for various spectral bands. These are called respectively the in-track and cross-track spectra. See Section 2 for description of power spectra.

Table 2 and Figure 7 are included here to help the reader understand how the energy in a scene is distributed among selected bands. One may discern from them how the signals in different spectral regions relate to each other. Precise correlations cannot be obtained from them, however, because of the host of meteorological and physical factors which come into play. They might be used, though, to infer some generalized qualitative behavior in the histograms. Table 2, for instance, shows the sunlight radiance reflected from a diffuse terrain element on line 1, and the radiance emitted from it on line 2, in the various bands indicated. From the calculated ratios, it is seen that reflected sunlight predominates in the 2.0-2.6 μm band, can be equally as effective as thermal radiation at 3.5-3.9 μm, and diminishes in effectiveness beyond. One important factor which is not included in Table 2 is the possible strong spectral variability of the emissivity of terrain material which could affect the ratios greatly. The emissivity used for Table 2 was nominally 0.9. Figure 7 shows the relative amounts of radiation in the selected thermal bands as affected by absorption in the atmosphere.

TABLE 2. COMPARISON OF REFLECTED SOLAR IRRADIANCE vs THERMAL RADIANCE AT THE CENTER OF DIFFERENT CHANNELS ($W-cm^{-2}-ster^{-1}-\mu m^{-1}$)

	2.0-2.6 μm	3.5-3.9 μm	4.5-5.5 μm	9.0-11.4 μm
Sun (S)	7.15×10^{-5}	2.55×10^{-5}	3.97×10^{-6}	2.59×10^{-7}
Thermal (T)	1.30×10^{-7}	4.03×10^{-5}	7.80×10^{-5}	9.87×10^{-4}
Ratio (T/S)	1/550	1.6/1	19.7/1	3800/1

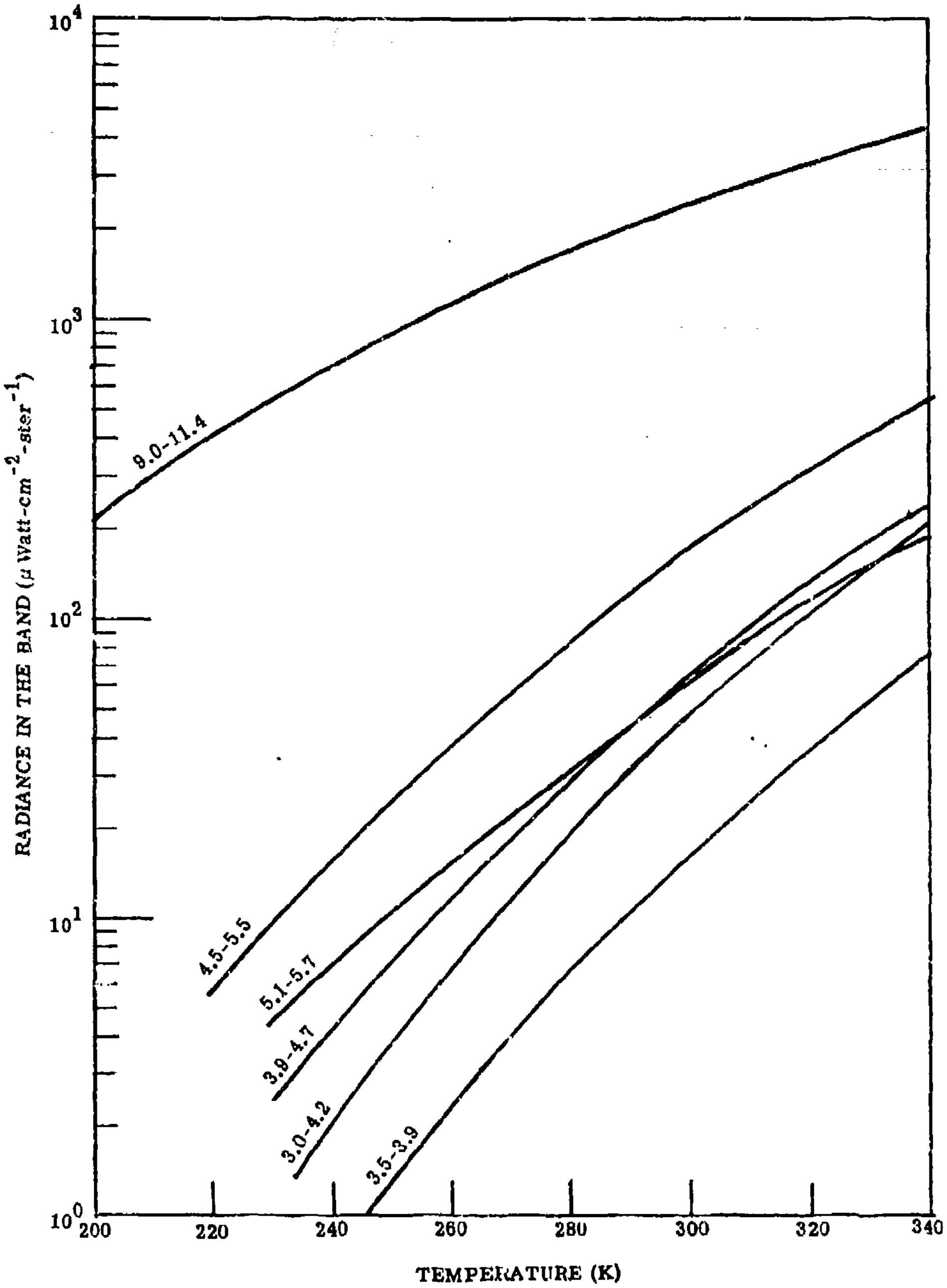


FIGURE 7. BAND RADIANCE AS A FUNCTION OF TEMPERATURE

BALTIMORE, MARYLAND*

Pertinent Scene and Flight Information

(Date of Flight: 11 May 1972)

*For specific discussions of these and associated data for this scenery, refer to Reference 1.

BALTIMORE Data

Wavelength Bands:

1.0-1.4 μm, 2.0-2.6 μm, 9.3-11.7 μm

IFOV: 2.5 mrad (cross-track); 5.0 mrad (in-track)

Altitude: 2500 ft | Depression Angle: 90°

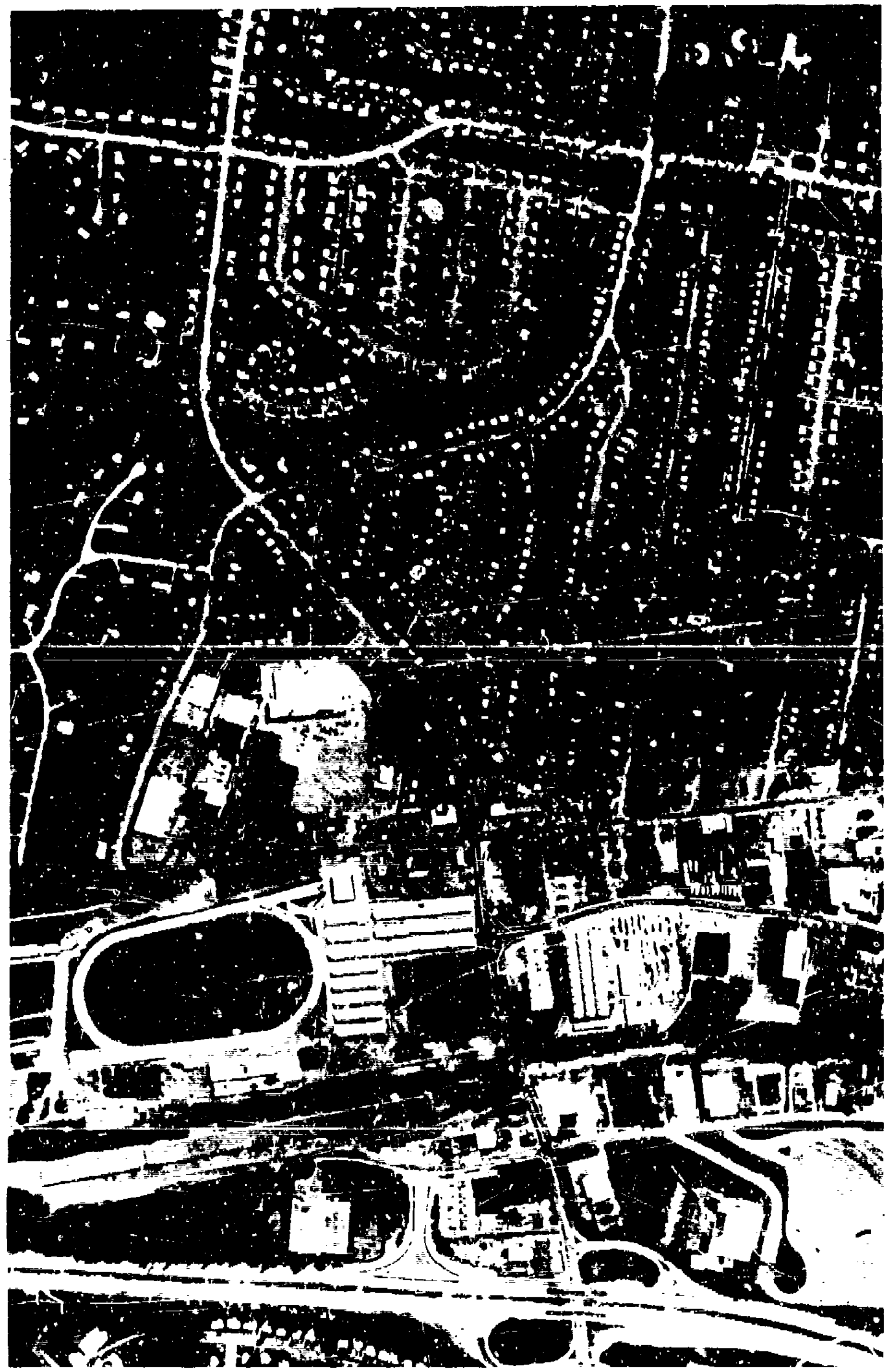
Time: 1130 hrs | Flight Direction: East

Ground Speed: ∿200 ft-sec^{-1}

Area Covered (Approx.): 5200 ft long x 4000 ft wide (1.0-1.4 μm, 2.0-2.6 μm)

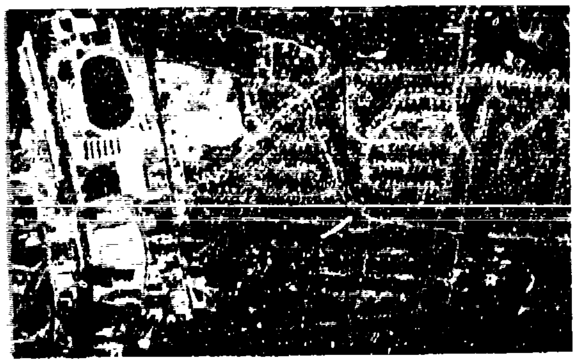
6250 ft long x 4000 ft wide (9.3-11.7 μm)

Meteorology: Clear sky; light haze at 5k ft; dry conditions

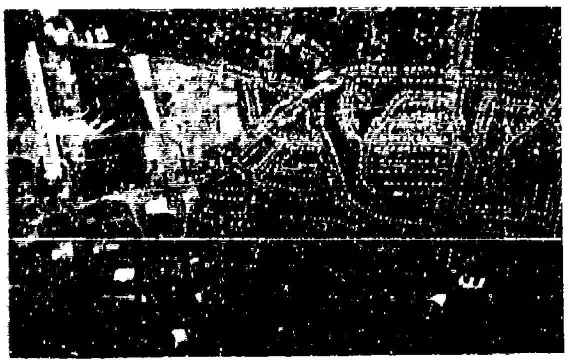


AERIAL PHOTOGRAPH - BALTIMORE

1.0 - 1.4 μm

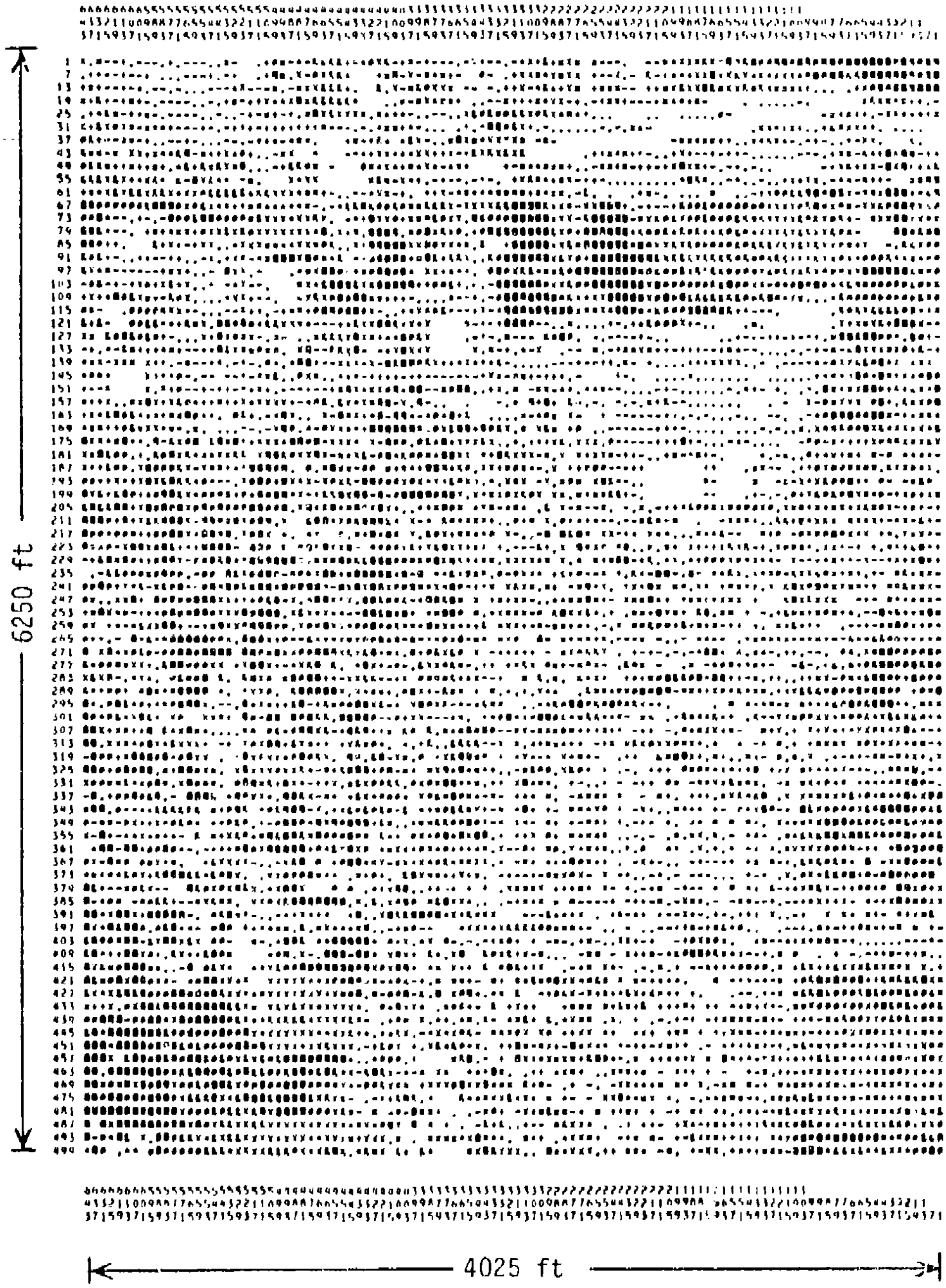


2.0 - 2.6 μm



9.3 - 11.7 μm

LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF BALTIMORE



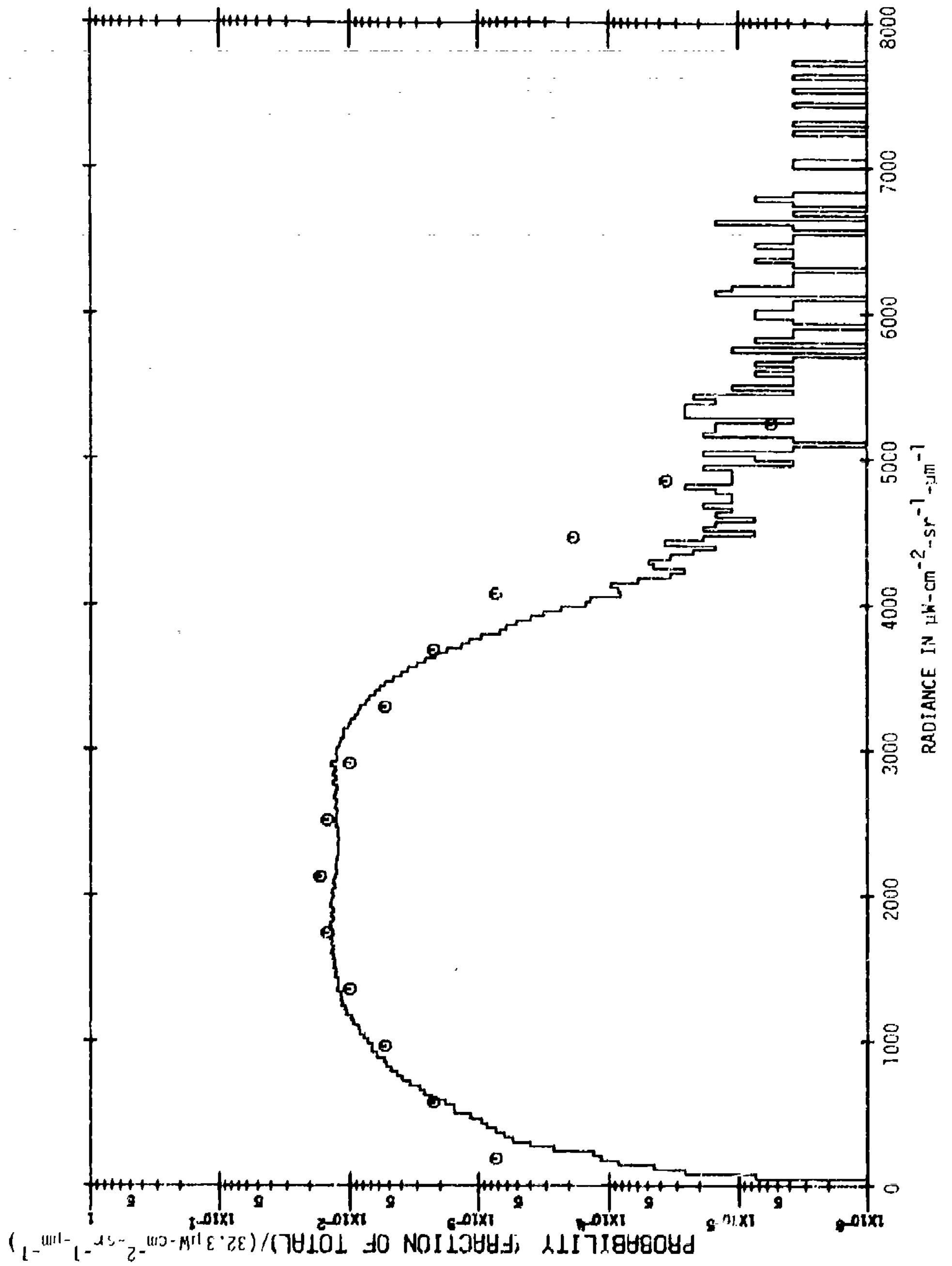
GREYMAP OF BALTIMORE

BALTIMORE, MARYLAND

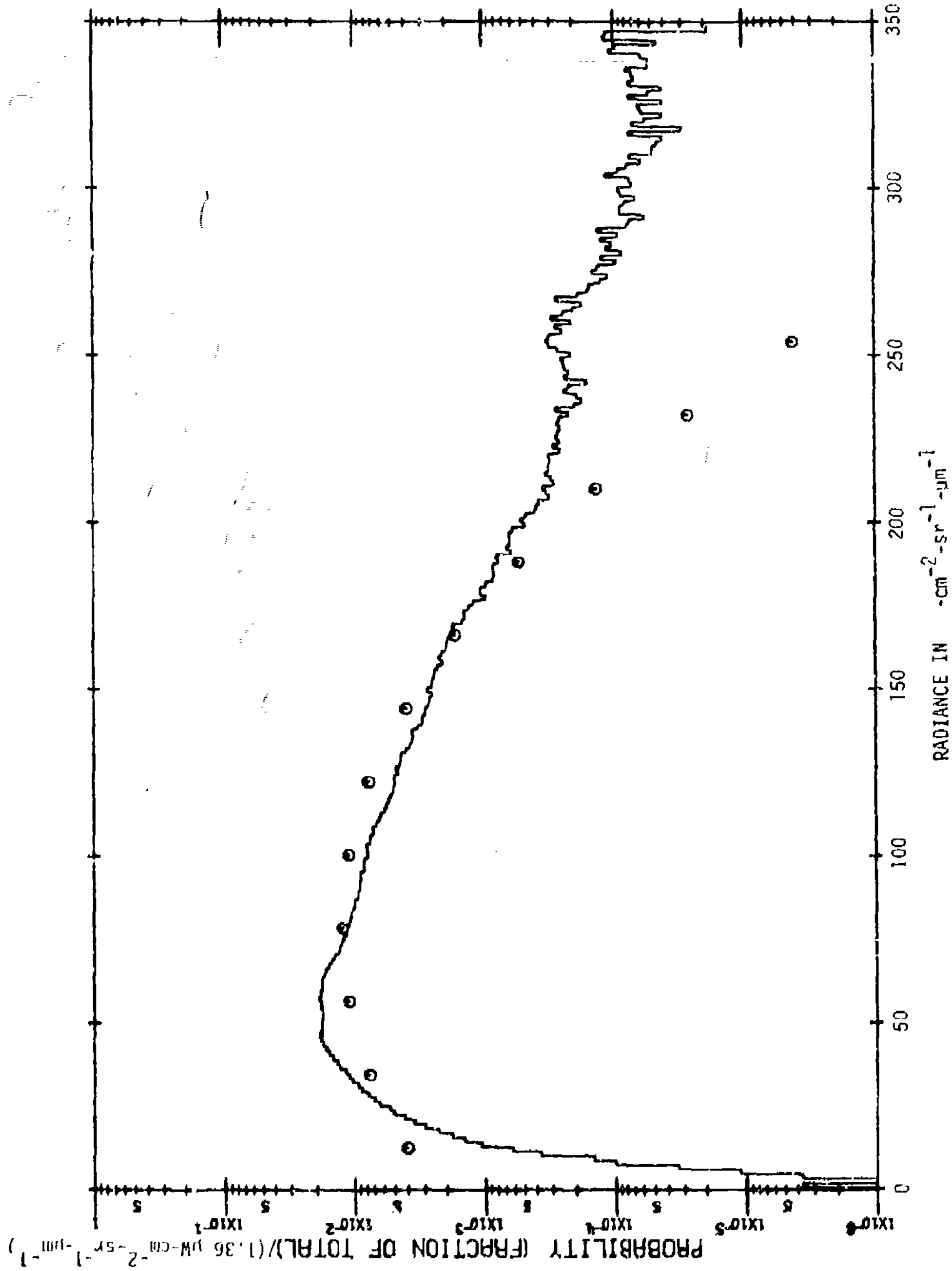
Histograms*

Spectral Bands: 1.0 - 1.4 μm
2.0 - 2.6 μm
9.3 - 11.7 μm

*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.

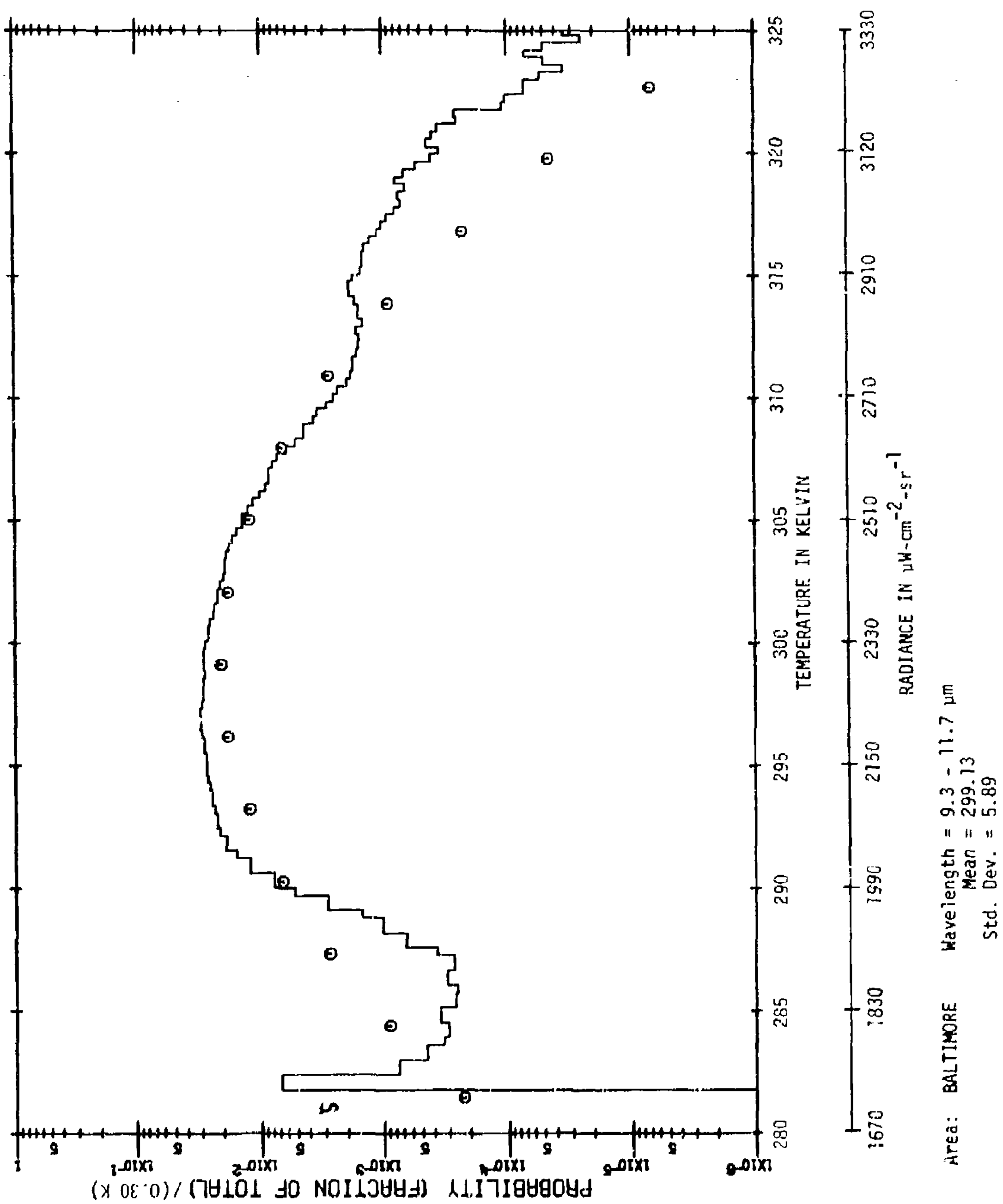


Area: BALTIMORE Wavelength = 1.0 - 1.4 µm
Mean = 2133.18
Std. Dev. = 777.51



Area: BALTIMORE

Wavelength = 2.0 - 2.6 μm
Mean = 78.47
Std. Dev. = 43.88


PROBABILITY (FRACTION OF TOTAL)/(0.30 K)
TEMPERATURE IN KELVIN
RADIANCE IN μW-cm-2-sr-1
280 285 290 295 300 305 310 315 320 325
1670 1830 1990 2150 2330 2510 2710 2910 3120 3330
1X10-6 1X10-5 1X10-4 1X10-3 1X10-2 1X10-1 1
Area: BALTIMORE
Wavelength = 9.3 - 11.7 μm
Mean = 299.13
Std. Dev. = 5.89

BALTIMORE, MARYLAND

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: Channel 2: 1.0 - 1.4 μm (μW-cm^{-2}-sr^{-1}-μm^{-1})

Channel 4: 2.0 - 2.6 μm (μW-cm^{-2}-sr^{-1}-μm^{-1})

Channel 5: 9.3 - 11.7 μm (°K)

---

*These data were obtained with the M-7 scanner. The 1.0-1.4 and 2.0-2.6 μm data are in spatial registration, but the 9.3-11.7 μm data were processed separately and are not in spatial registration with the 1.0-1.4 and 2.0-2.6 μm data. Hence, spectral correlation coefficients have not been determined between the 9.3-11.7 μm data and either the 1.0-1.4 μm or 2.0-2.6 μm data.

BALTIMORE

Number of Subregions = 1

Pixel Subarea Divisions at: 1 645

Line Subarea Divisions at: 1 500

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
4 (2.0 - 2.6 μm)
5 (9.3 - 11.7 μm)

Correlation	2	4
2	1.000	
4	0.084	1.000

Channels	2	4	5
Mean	2.1332E+03	7.8471E+01	2.9913E+02
St. Dev.	7.7751E+02	4.3876E+01	5.8879E+00
Total Points	269610	269610	322500

BALTIMORE, MARYLAND

Ellipse Statistics

Spectral Bands: 1.0 - 1.4 μm
9.3 - 11.7 μm

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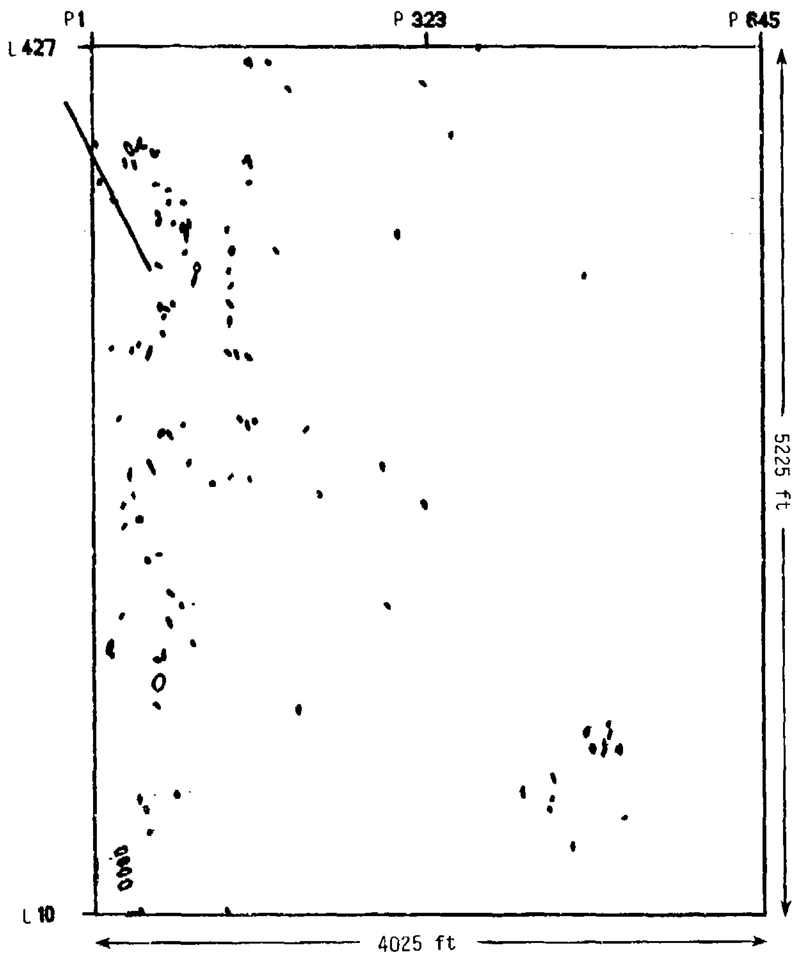


Area: BALTIMORE (Wavelength = 1.0 - 1.4 μm)
Radiance Threshold = Mean + 2.13 σ
Mean = 2133.18 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 777.51 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

BALTIMORE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.13 σ

Wavelength = 1.0 - 1.4 μm

Mean = 2133.18 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 777.51 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

SQUARE METERS	FREQUENCY
16.0 TO 20.0	0
20.0 TO 25.0	46
25.0 TO 30.0	17
30.0 TO 35.0	0
35.0 TO 40.0	16
40.0 TO 45.0	12
45.0 TO 50.0	0
50.0 TO 75.0	12
75.0 TO 100.0	8
100.0 TO 150.0	2
150.0 TO 200.0	4
200.0 TO 250.0	2
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	1
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 120

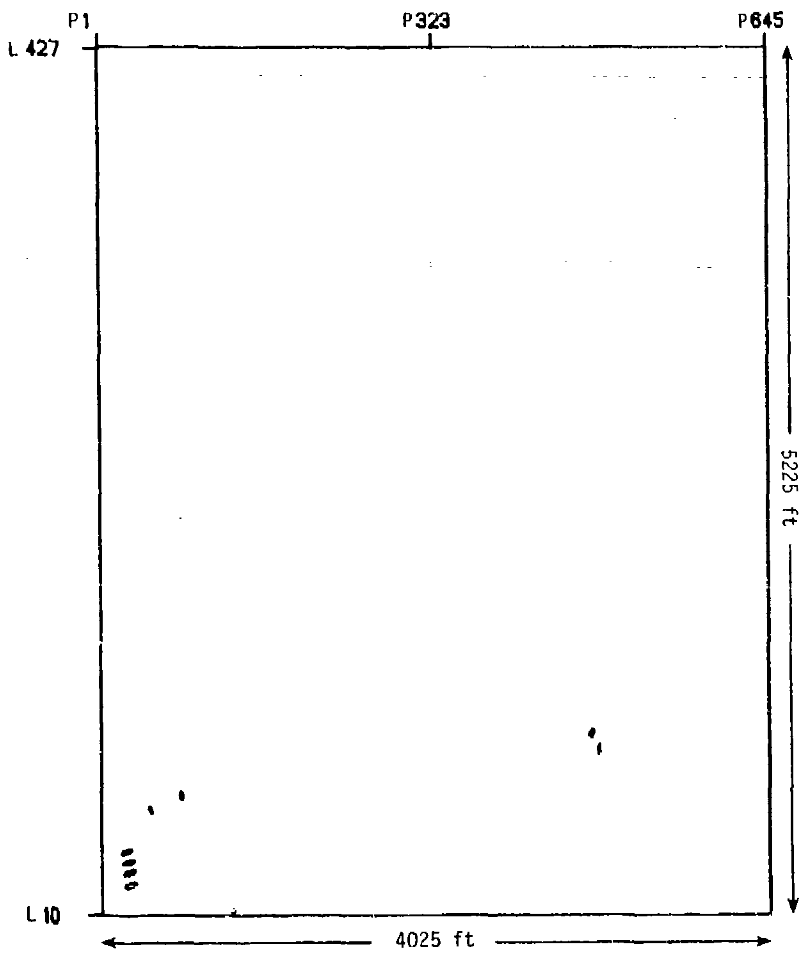
260 FEATURES WITH AREAS LESS THAN16.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	1
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	8
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	26
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	21
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	16
32 TO 39	104 TO 127	15
39 TO 45	127 TO 147	6
45 TO 55	147 TO 180	13
55 TO 71	180 TO 232	7
71 TO 100	232 TO 328	5
OVER 100	OVER 328	2

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	0
1.1 TO 1.2	15
1.2 TO 1.3	6
1.3 TO 1.4	27
1.4 TO 1.5	11
1.5 TO 1.6	10
1.6 TO 1.7	20
1.7 TO 1.8	19
1.8 TO 1.9	6
1.9 TO 2.0	6
2.0 TO 2.4	6
2.4 TO 2.6	0
2.6 TO 2.8	2
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: BALTIMORE (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 3.40 σ

Mean = 2133.18 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 777.51 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

BALTIMORE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.40 σ

Wavelength = 1.0 - 1.4 μm

Mean = 2133.18 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 777.51 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
16.0	TO	20.0	0
20.0	TO	25.0	0
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	1
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	3
75.0	TO	100.0	0
100.0	TO	150.0	3
150.0	TO	200.0	1
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 9

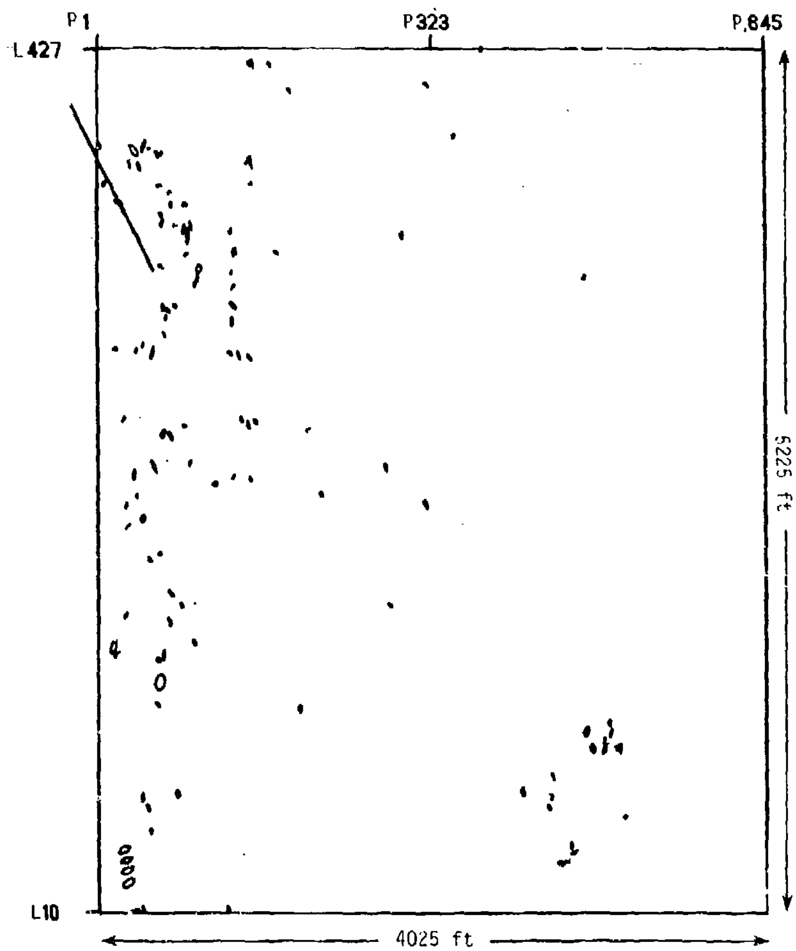
12 FEATURES WITH AREAS LESS THAN16.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	1
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
2	TO	39	104	TO	127	2
39	TO	45	127	TO	147	1
45	TO	55	147	TO	180	1
55	TO	71	180	TO	232	4
71	TO	100	232	TO	328	0
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	1
1.2	TO	1.3	1
1.3	TO	1.4	1
1.4	TO	1.5	1
1.5	TO	1.6	2
1.6	TO	1.7	2
1.7	TO	1.8	1
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	0
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: BALTIMORE (Wavelength = 9.3 - 11.7 μm)
Temperature Threshold = Mean + 3.23 σ
Mean = 299.13 Kelvin
Std. Dev. = σ = 5.89 Kelvin
EQUIVALENT ELLIPTICAL AREAS

ERIM

BALTIMORE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.32 σ

Wavelength = 9.3 - 11.7 μm

Mean = 299.13 Kelvin

σ = 5.89 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
16.0	TO	20.0	0
20.0	TO	25.0	46
25.0	TO	30.0	17
30.0	TO	35.0	0
35.0	TO	40.0	15
40.0	TO	45.0	11
45.0	TO	50.0	0
50.0	TO	75.0	12
75.0	TO	100.0	8
100.0	TO	150.0	2
150.0	TO	200.0	4
200.0	TO	250.0	2
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 118

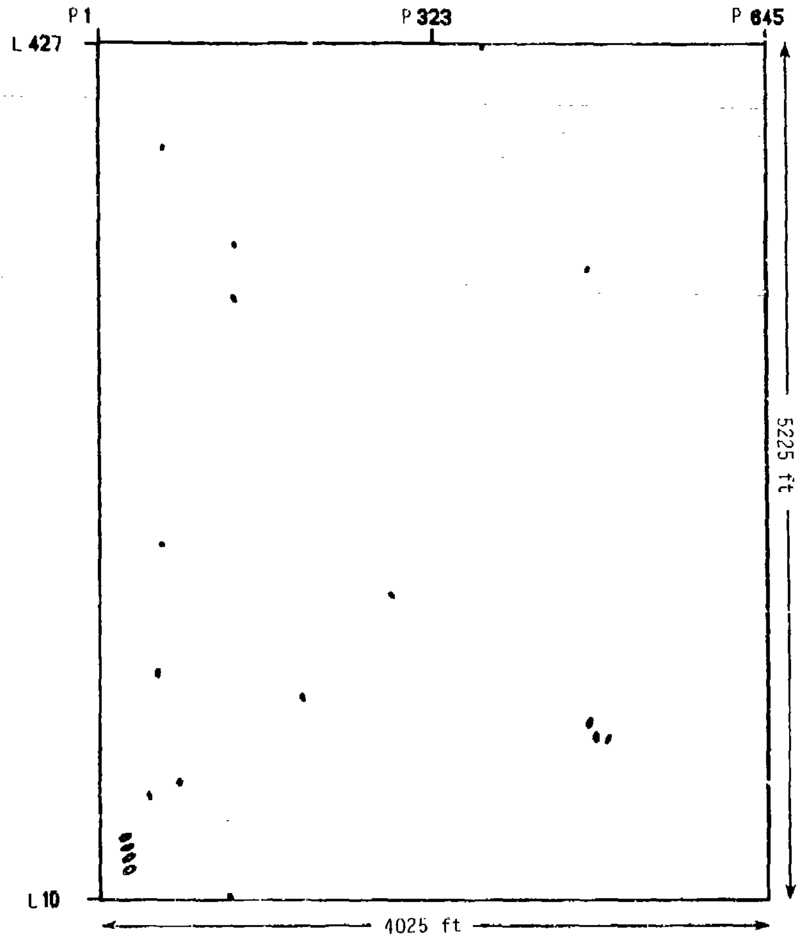
262 FEATURES WITH AREAS LESS THAN16.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	1
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	8
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	26
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	21
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	16
32	TO	39	104	TO	127	13
39	TO	45	127	TO	147	6
45	TO	55	147	TO	180	13
55	TO	71	180	TO	232	7
71	TO	100	232	TO	328	5
OVER		100	OVER		328	2

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	1
1.0	TO	1.1	0
1.1	TO	1.2	15
1.2	TO	1.3	6
1.3	TO	1.4	27
1.4	TO	1.5	11
1.5	TO	1.6	10
1.6	TO	1.7	19
1.7	TO	1.8	9
1.8	TO	1.9	6
1.9	TO	2.0	6
2.0	TO	2.4	6
2.4	TO	2.6	0
2.6	TO	2.8	2
2.8	TO	3.0	0
3.0	TO	3.5	[illegible]
3.5	TO	4.0	
4.0	TO	4.5	
OVER		4.5	



Area: BALTIMORE (Wavelength = 9.3 - 11.7 μm)
Temperature Threshold = Mean + 3.90 σ
Mean = 299.13 Kelvin
Std. Dev. = σ = 5.89 Kelvin
EQUIVALENT ELLIPTICAL AREAS

BALTIMORE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.90 σ
Wavelength = 9.3 - 11.7 μm
Mean = 299.13 Kelvin
σ = 5.89 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
16.0 TO	20.0	0
20.0 TO	25.0	6
25.0 TO	30.0	2
30.0 TO	35.0	0
35.0 TO	40.0	1
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	3
75.0 TO	100.0	2
100.0 TO	150.0	1
150.0 TO	200.0	2
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 19

35 FEATURES WITH AREAS LESS THAN16.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	2
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	3
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	1
32 TO 39	104 TO 127	4
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	4
71 TO 100	232 TO 328	2
OVER 100	OVER 328	0

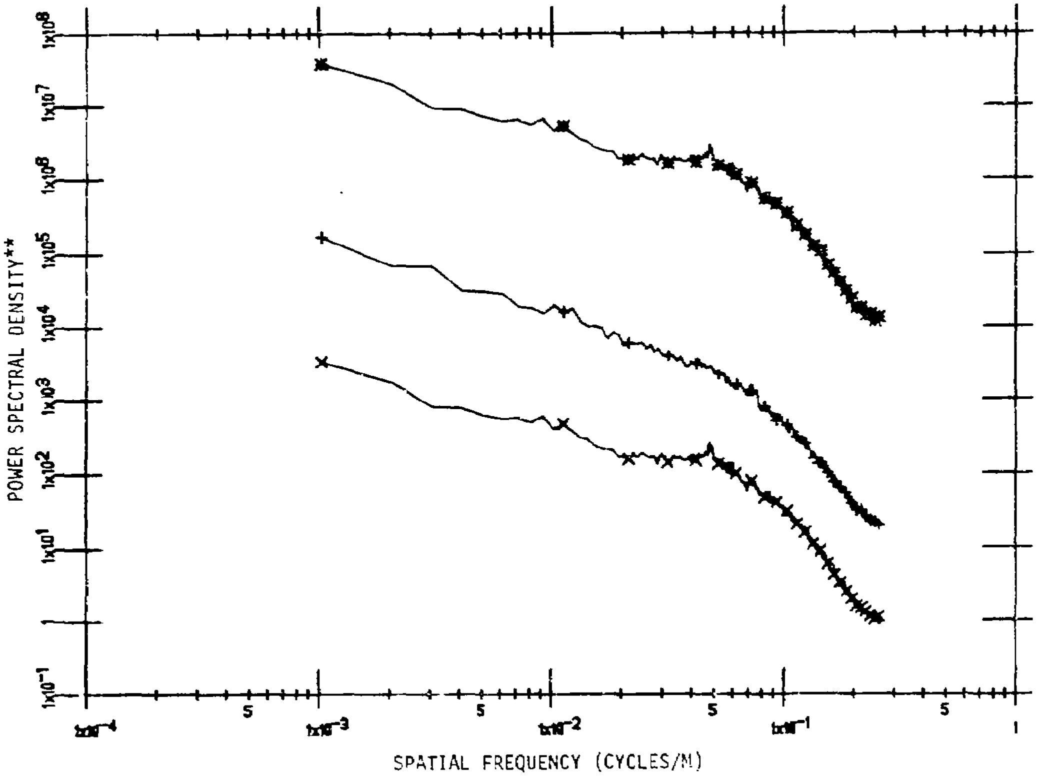
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	1
1.1 TO 1.2	1
1.2 TO 1.3	1
1.3 TO 1.4	4
1.4 TO 1.5	3
1.5 TO 1.6	4
1.6 TO 1.7	1
1.7 TO 1.8	1
1.8 TO 1.9	2
1.9 TO 2.0	0
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

BALTIMORE, MARYLAND

Power Spectra

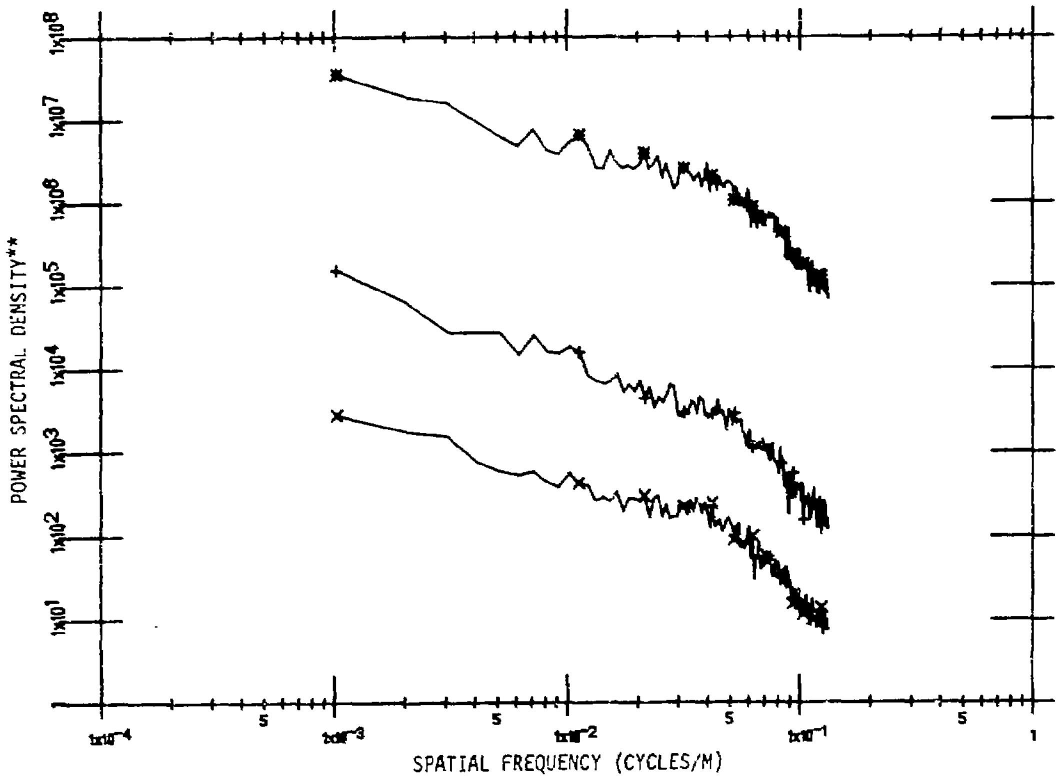
Spectral Bands: 1.0 - 1.4 μm
2.0 - 2.6 μm
9.3 - 11.7 μm



Area: BAL˜IMORE CROSS-TRACK Wavelength = 1.0-1.4 (*), 2.0-2.6 (+), 9.3-11.7 (X)

POWER SPECTRA

** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 μm and 2.0 to 2.6 μm bands and $(°K)^2$/cycle/meter for 9.3 to 11.7 μm band.



Area: BALTIMORE IN-TRACK Wavelength = 1.0-1.4 (*), 2.0-2.6 (+), 9.3-11.7 (X)

POWER SPECTRA

** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 μm and 2.0 to 2.6 μm bands and $(°K)^2$/cycle/meter for 9.3 to 11.7 μm band.

BLACK HILLS, SOUTH DAKOTA*

Pertinent Scene and Flight Information

(Date of Flight: 22 July 1969)

*For specific discussions of these and associated data for this scenery, refer to Reference 1.

BLACK HILLS-1 Data

Wavelength Bands:

1.0-1.4 μm, 2.0-2.6 μm, 4.5-5.5 μm, 8.0-13.5 μm

IFOV: 3.5 mrad (cross-track); 6.6 mrad (in-track)

Altitude: 1500 ft — Depression Angle: 90°

Time: 1330 hrs — Flight Direction: East

Ground Speed: ∿200 ft-sec^{-1}

Area Covered (Approx.): 1150 ft wide x 7100 ft long (1.0-1.4 μm, 2.0-2.6 μm, 4.5-5.5 μm)

1150 ft wide x 7200 ft long (8.0-13.5 μm)

Meteorology: Visibility > 15 mi; clear day, dry; cloud cover 10%

BLACK HILLS-2 Data

Wavelength Bands:

1.0-1.4 μm, 1.5-1.8 μm, 2.0-2.6 μm

IFOV: 3.5 mrad (cross-track); 6.6 mrad (in-track)

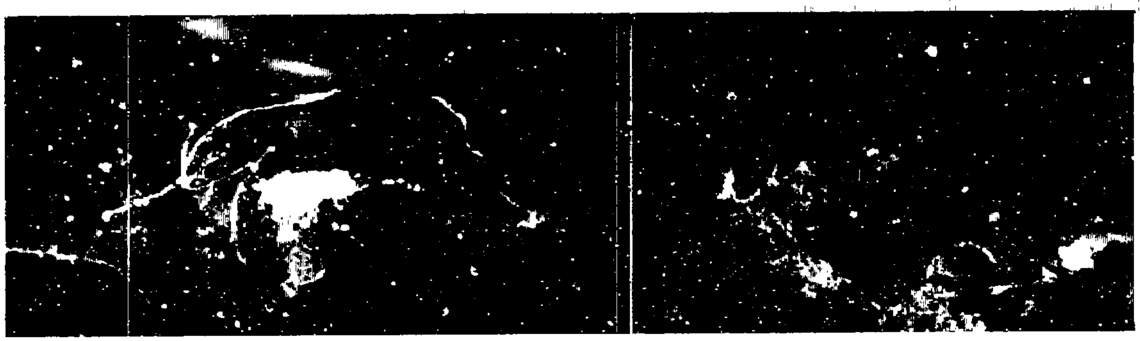
Altitude: 1500 ft — Depression Angle: 90°

Time: 1330 hrs — Flight Direction: East

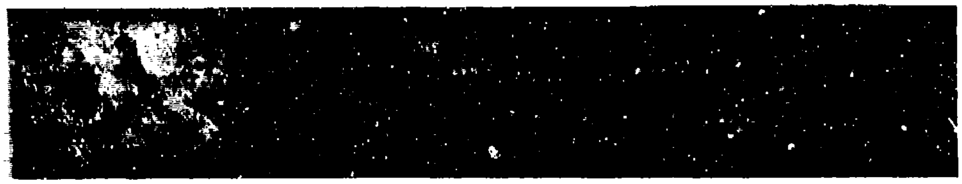
Ground Speed: ∿200 ft-sec^{-1}

Area Covered (Approx.): 2400 ft wide x 7200 ft long

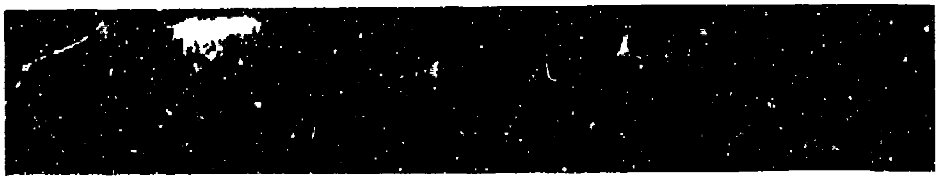
Meteorology: Visibility > 15 mi; clear day, dry; cloud cover 10%



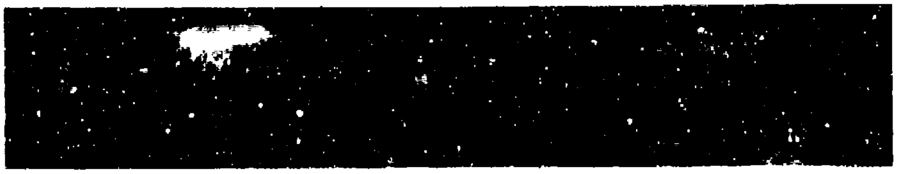
VISIBLE REGION (.50 -.52 μm) SCANNER IMAGERY OF BLACK HILLS
(IN LEIU OF AERIAL PHOTOGRAPH)



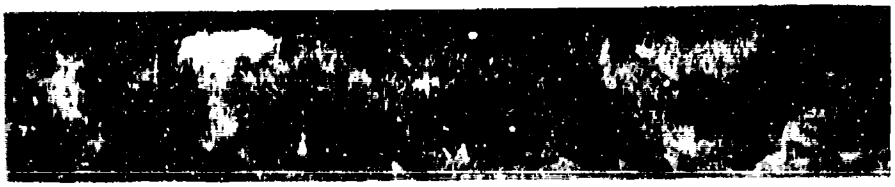
1.0 - 1.4 μm



2.0 - 2.6 μm

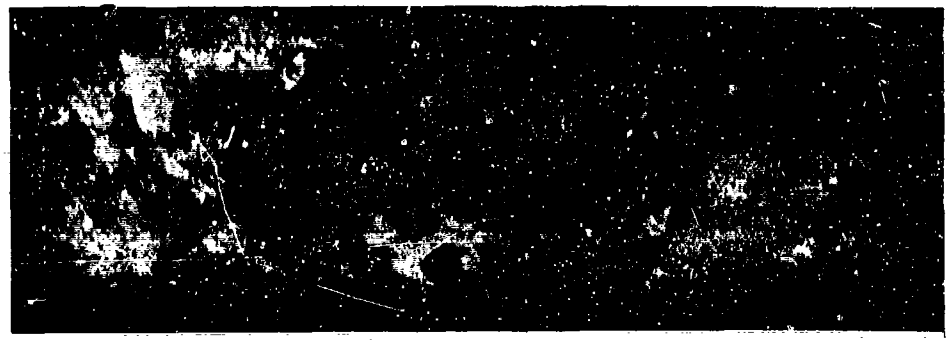


4.5 - 5.5 μm

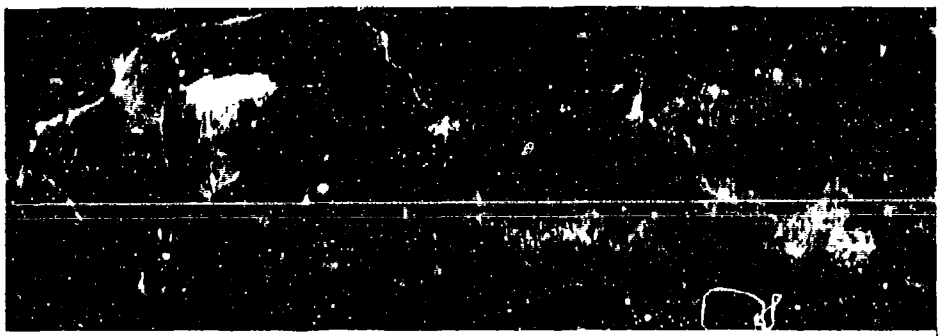


8.0 - 13.5 μm

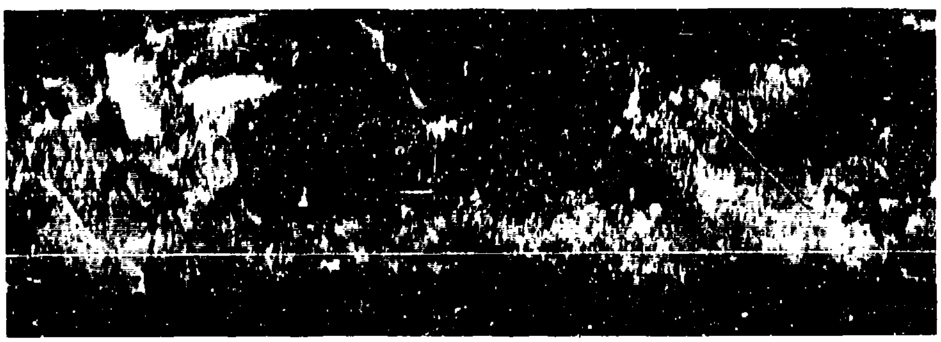
LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF BLACK HILLS-1



1.0 - 1.4 μm

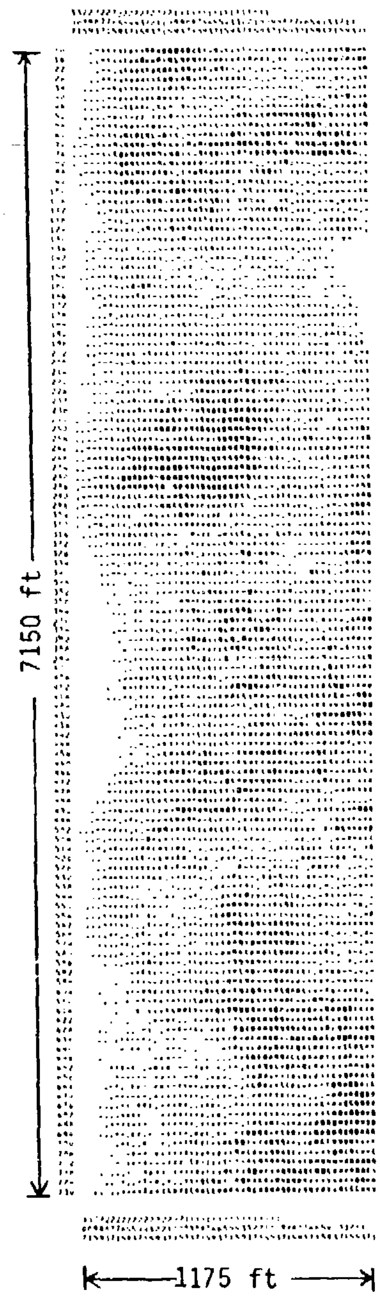


1.5 - 1.8 μm

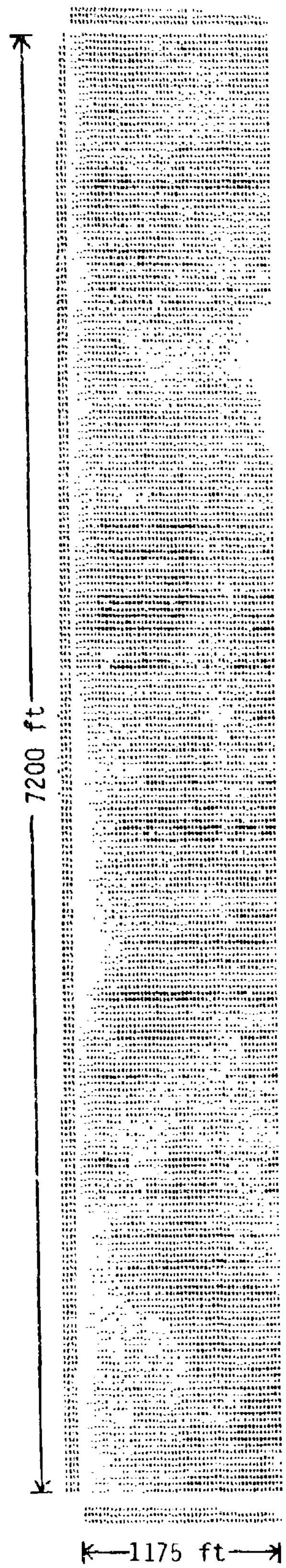


2.0 - 2.6 μm

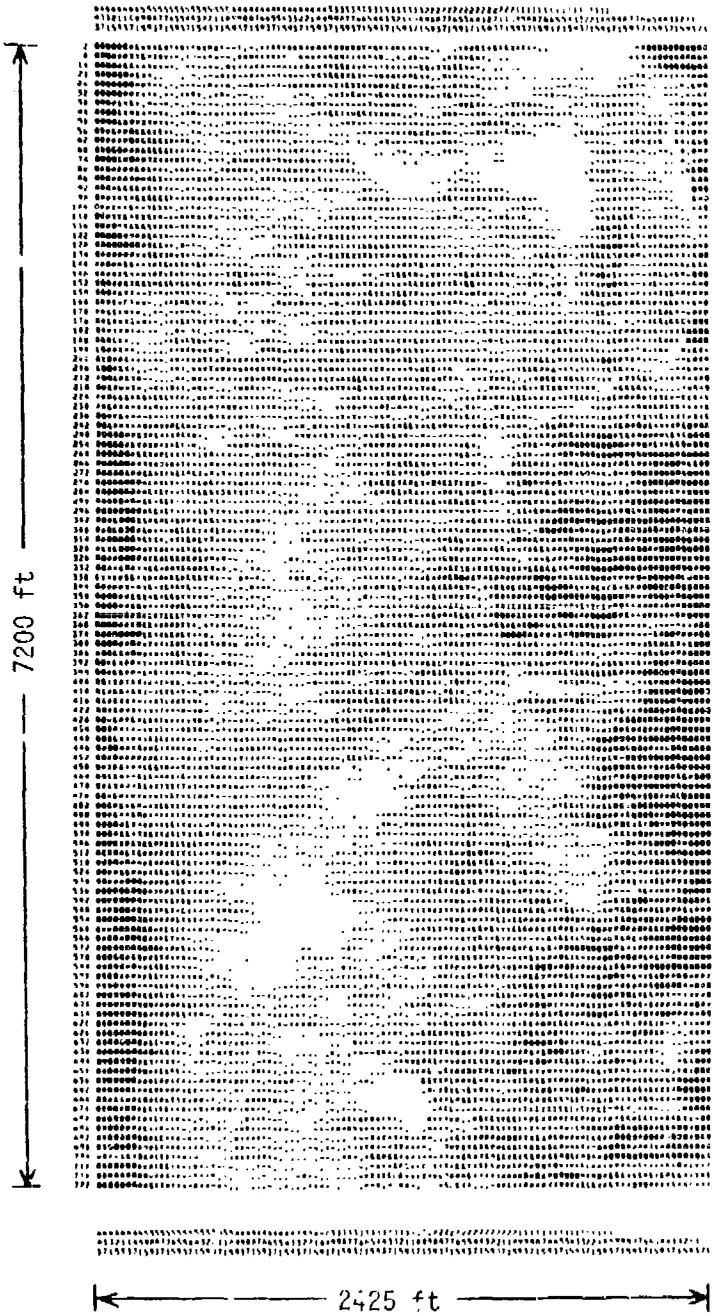
LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF BLACK HILLS-2



GREYMAP OF BLACK HILLS-1 ($\Delta\lambda$: 4.5-5.5 μm)



GREYMAP OF BLACK HILLS-1 ($\Delta\lambda$: 8.0-13.5 μm)



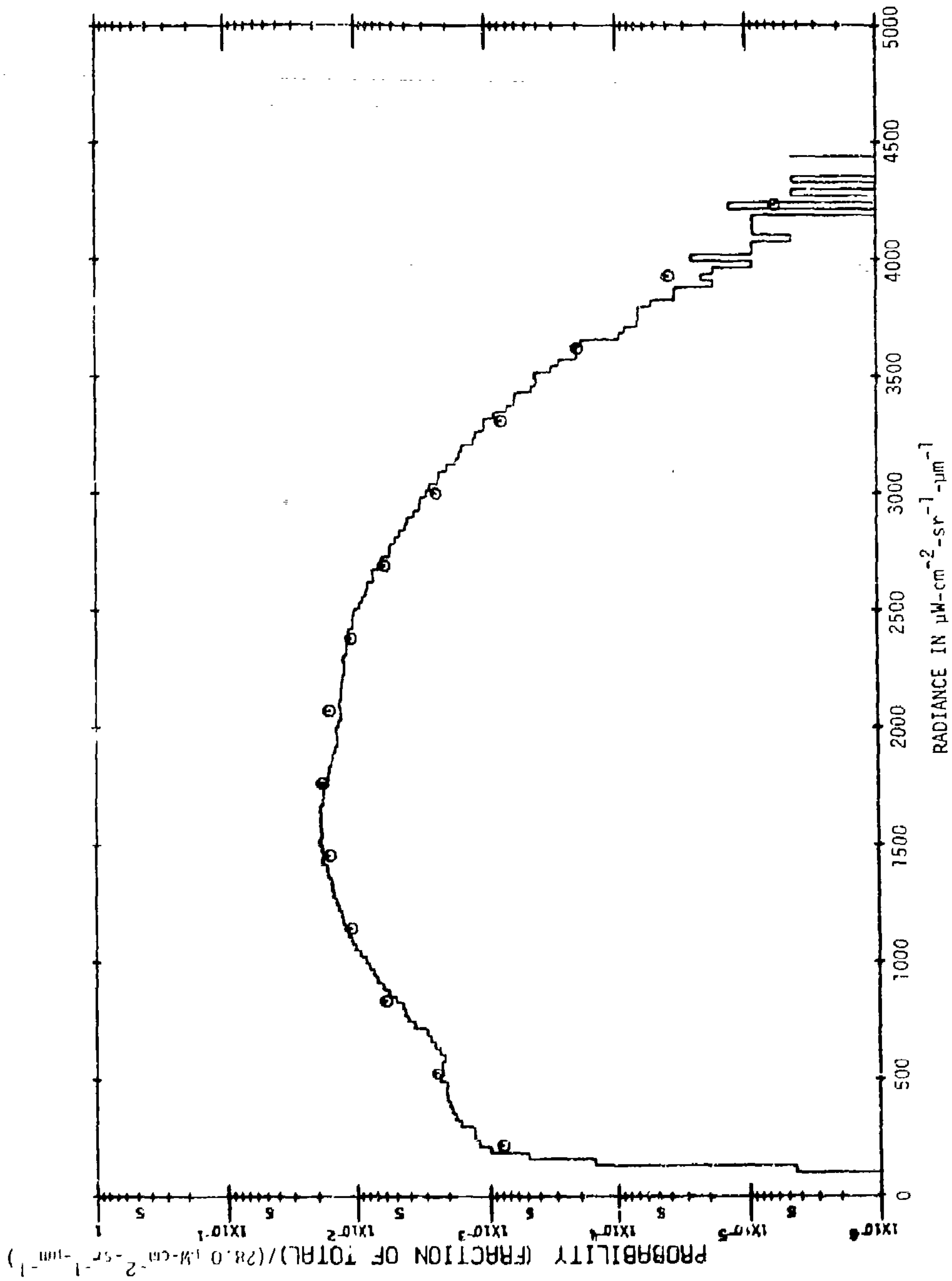
GREYMAP OF BLACK HILLS-2 (Δλ: 2.0-2.6 μm)

BLACK HILLS, SOUTH DAKOTA

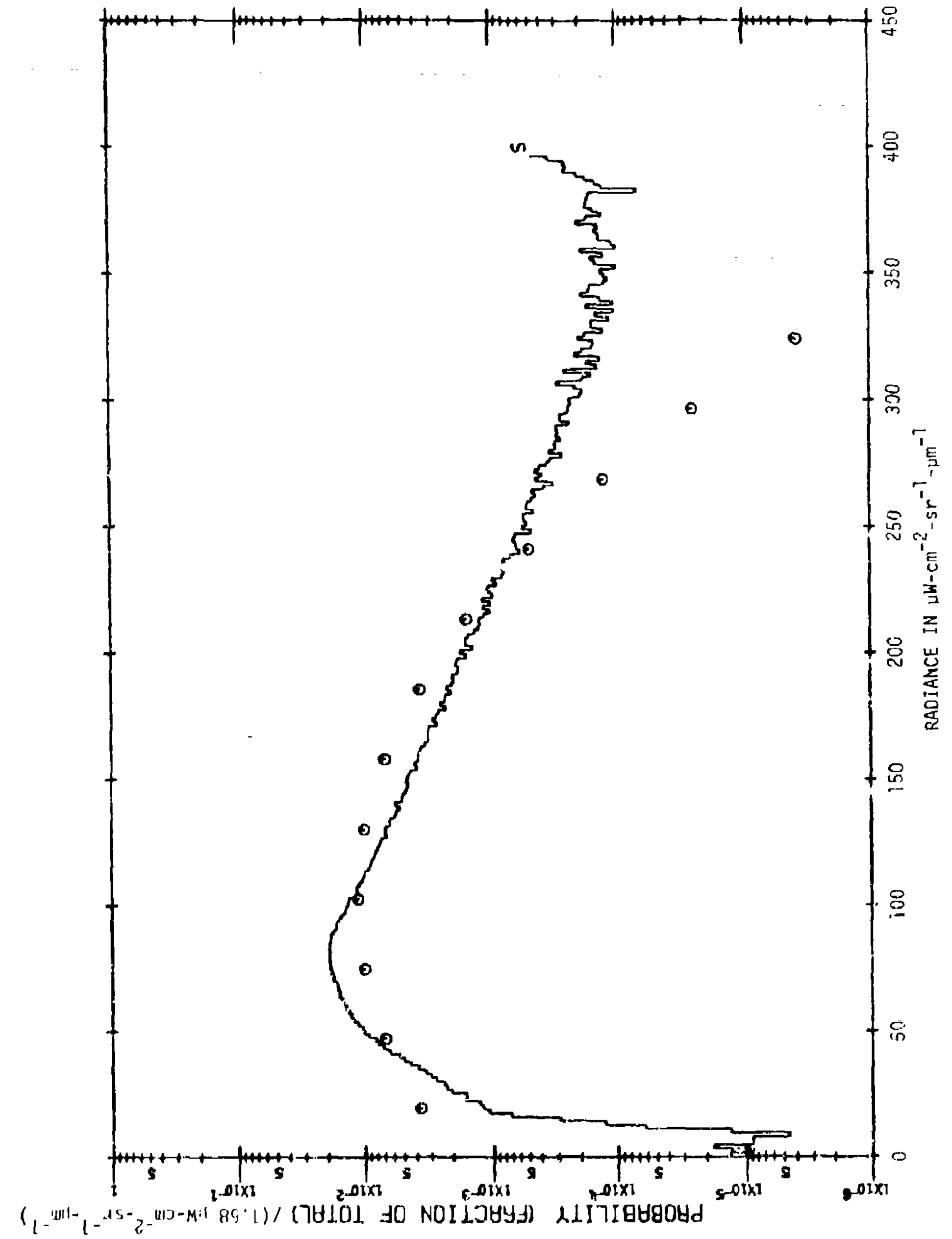
Histograms*

Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 13.5 μm

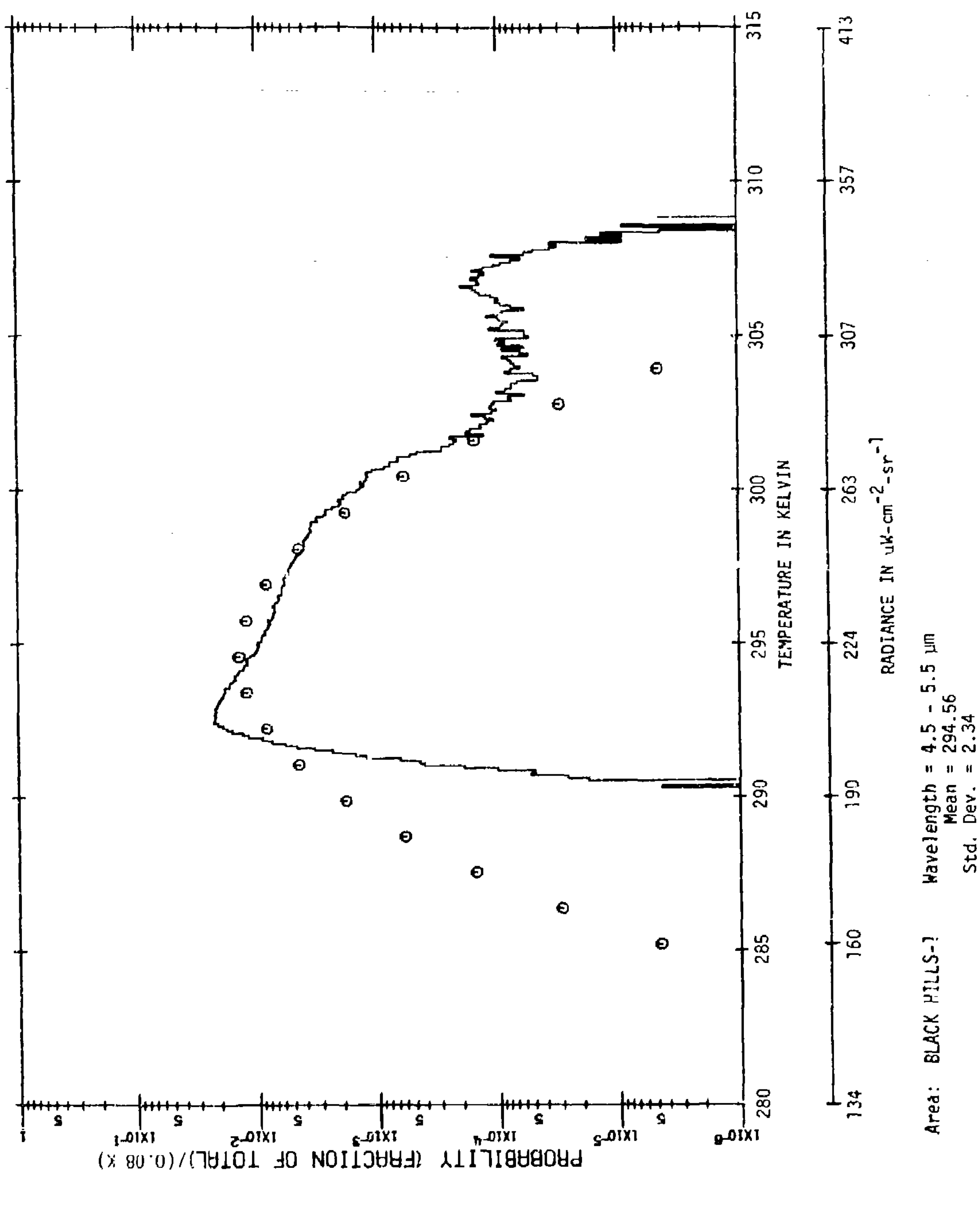
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.

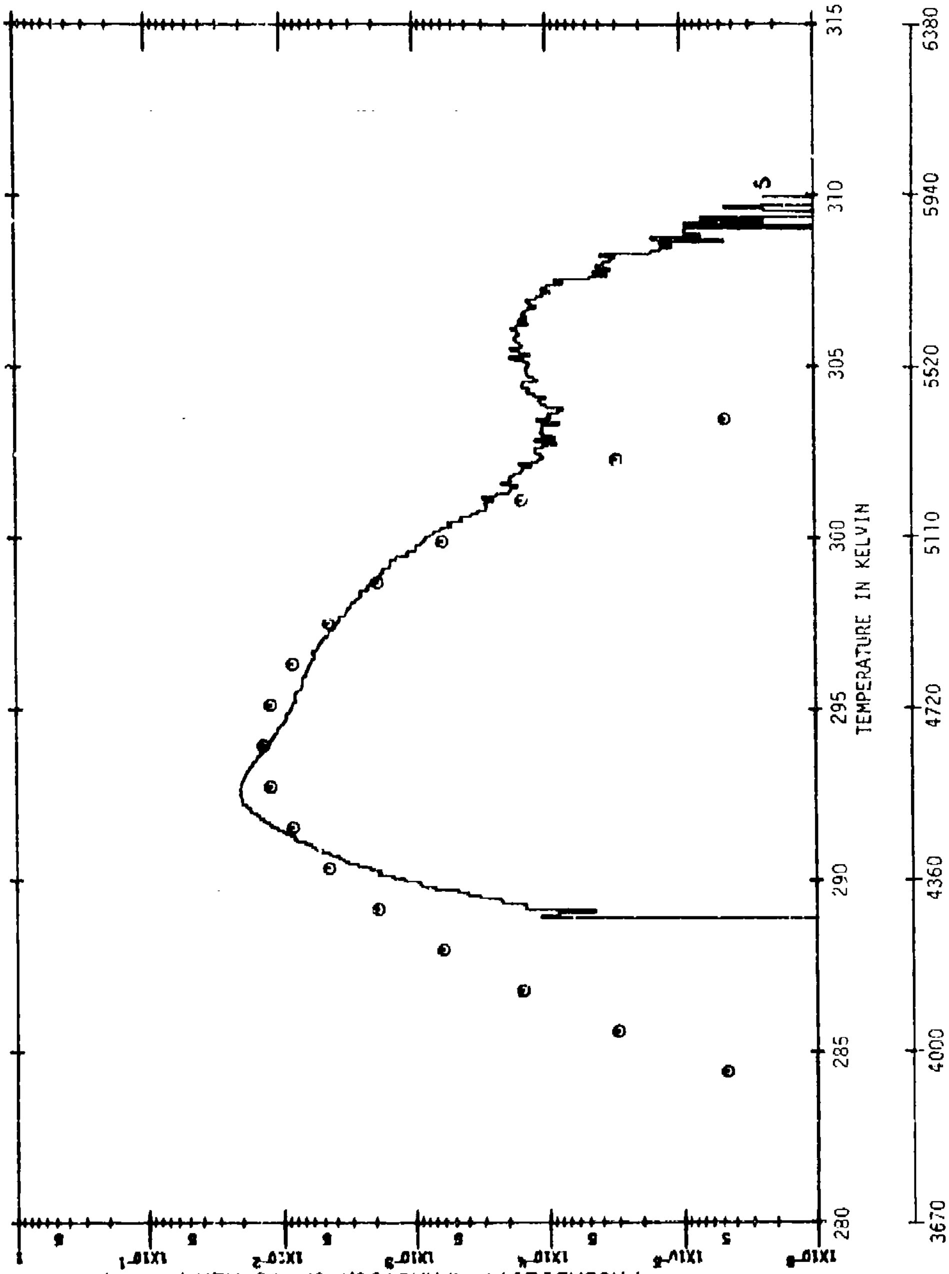


Area: BLACK HILLS-1 Wavelength = 1.0 - 1.4 μm
Mean = 1799.05
Std. Dev. = 617.70



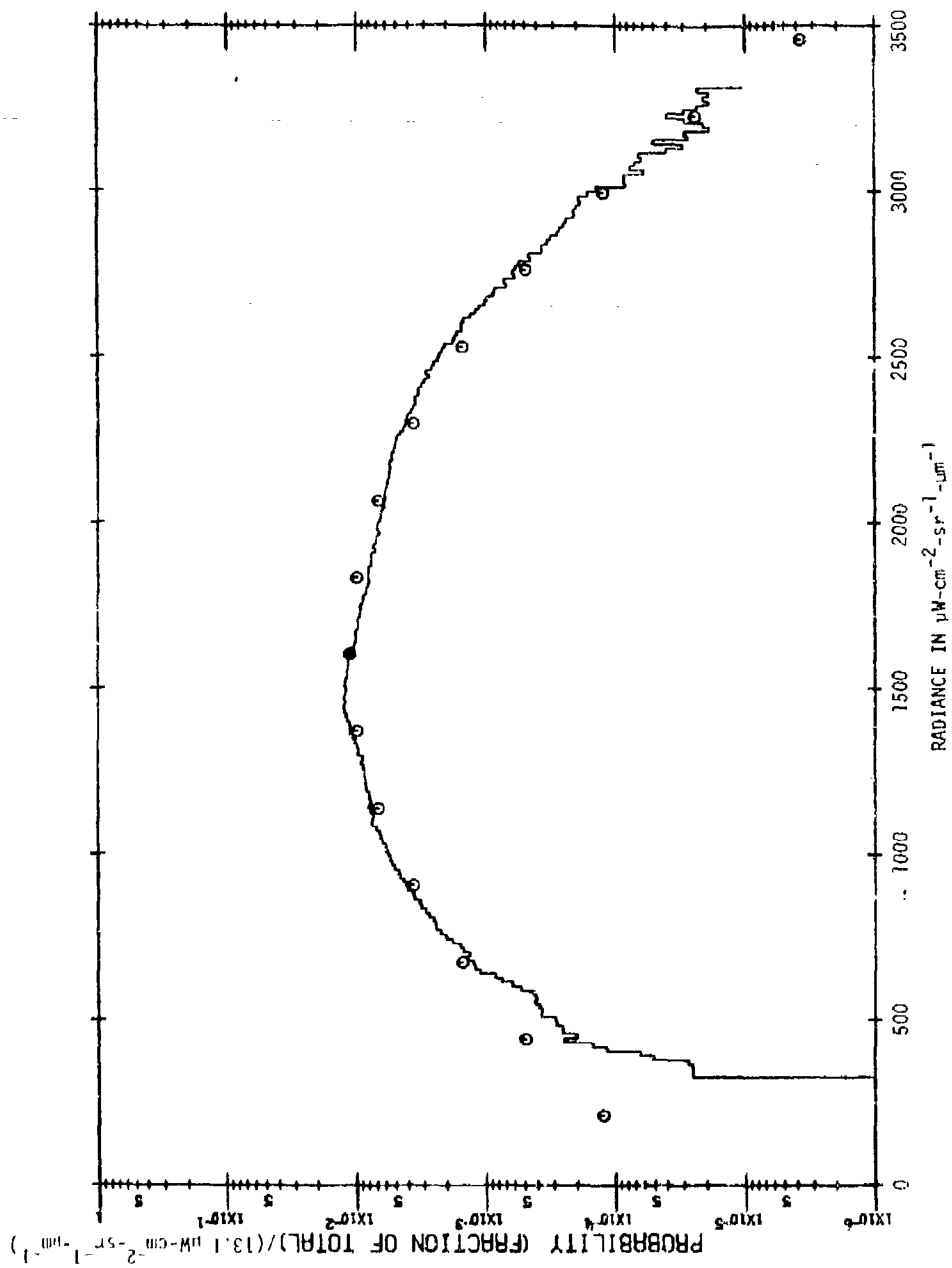
Area: BLACK HILLS-1 Wavelength = 2.0 - 2.6 µm
Mean = 105.56
Std. Dev. = 55.35


PROBABILITY (FRACTION OF TOTAL)/(0.08 K)
1X10-1
1X10-2
1X10-3
1X10-4
1X10-5
1X10-6
280
285
290
295
300
305
310
315
TEMPERATURE IN KELVIN
134
160
190
224
263
307
357
413
RADIANCE IN uK-cm-2-sr-1
Area: BLACK HILLS-1
Wavelength = 4.5 - 5.5 µm
Mean = 294.56
Std. Dev. = 2.34

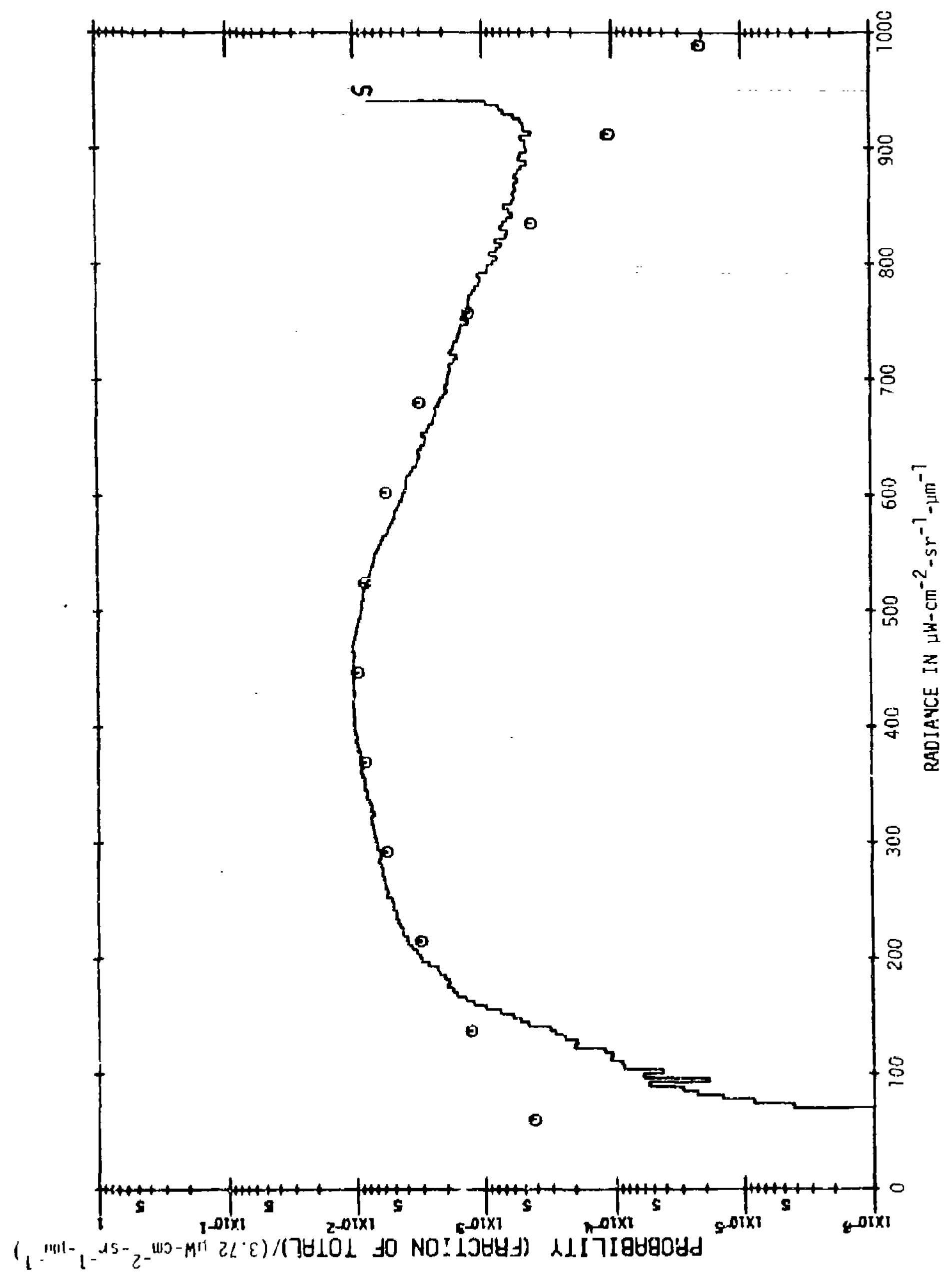


Area: BLACK HILLS-1

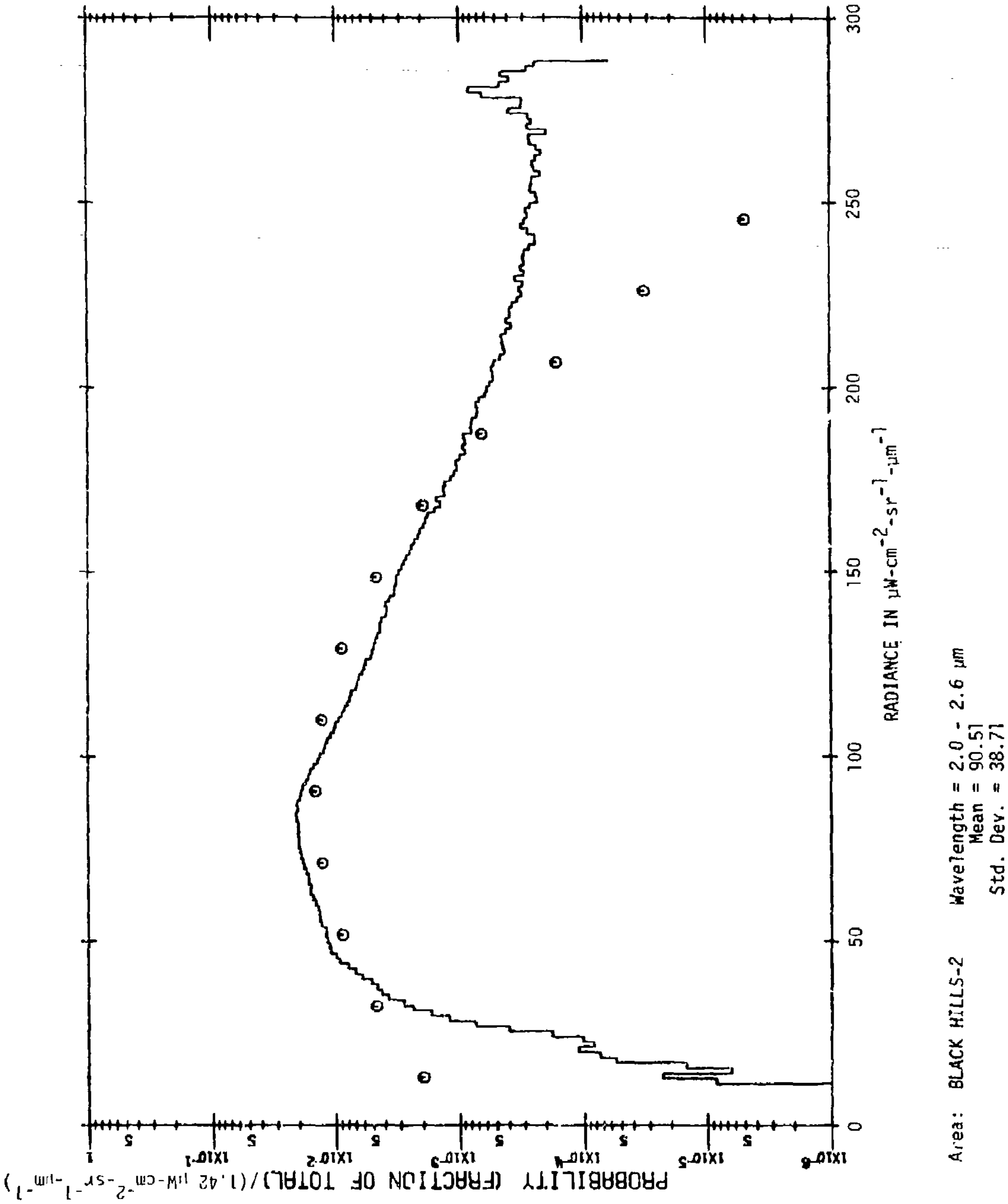
Wavelength = 8.0 - 13.5 µm
Mean = 293.95
Std. Dev. = 2.38



Area: BLACK HILLS-2 Wavelength = 1.0 - 1.4 µm
Mean = 1602.71
Std. Dev. = 463.80



Area: BLACK HILLS-2   Wavelength = 1.5 - 1.8 µm
Mean = 447.21
Std. Dev. = 154.85


PROBABILITY (FRACTION OF TOTAL)/(1.42 μW-cm⁻²-sr⁻¹-μm⁻¹)
RADIANCE IN μW-cm⁻²-sr⁻¹-μm⁻¹
0
50
100
150
200
250
300
1
5
1X10⁻¹
5
1X10⁻²
5
1X10⁻³
5
1X10⁻⁴
5
1X10⁻⁵
5
1X10⁻⁶
Area: BLACK HILLS-2
Wavelength = 2.0 - 2.6 μm
Mean = 90.51
Std. Dev. = 38.71

BLACK HILLS, SOUTH DAKOTA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: 1.0 - 1.4 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

1.5 - 1.8 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

4.5 - 5.5 μm (°K)

8.0 - 13.5 μm (°K)

*The Black Hills-1 data were collected with an M-5 scanner with thermal calibration plates in part of the scanner field-of-view. The 8.0-13.5 μm detector and the 1.0-1.4, 2.0-2.6, 4.5-5.5 μm detectors were on opposite ends of the scanner and are not in spatial registration. Hence, spectral correlation coefficients have not been determined between the 8.5-13.5 μm data and the 1.0-1.4, 2.0-2.6, or 4.5-5.5 μm lata.

BLACK HILLS-1

Number of Subregions = 1

Pixel Subarea Divisions at: 1 311

Line Subarea Divisions at: 10 732

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
4 (2.0 - 2.6 μm)
5 (4.5 - 5.5 μm)
12 (8.0 - 13.5 μm)

Correlation	2	4	5
2	1.000		
4	0.505	1.000	
5	-0.166	0.498	1.000

Channels	2	4	5	12
Mean	1.7990E+03	1.0556E+02	2.9456E+02	2.9395E+02
St. Dev.	6.1770E+02	5.5347E+01	2.3389E+00	2.3831E+00
Total Points	224130	224130	224130	425630

BLACK HILLS-2

Number of Subregions = 1

Pixel Subarea Divisions at: 1 645

Line Subarea Divisions at: 2 728

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 3 (1.5 - 1.8 μm)
5 (1.0 - 1.4 μm)
7 (2.0 - 2.6 μm)

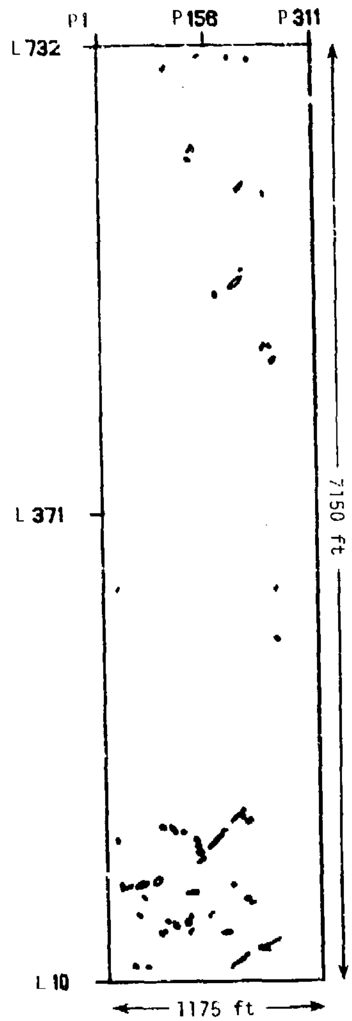
Correlation	3	5	7
3	1.000		
5	0.743	1.000	
7	0.908	0.518	1.000

Channels	3	5	7
Mean	4.4721E+02	1.6027E+03	9.0510E+01
St. Dev.	1.5485E+02	4.6380E+02	3.8712E+01
Total Points	468915	4689[illegible]	468915

BLACK HILLS, SOUTH DAKOTA

Ellipse Statistics

Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
8.0 - 13.5 μm



Area: BLACK HILLS-1 (Wavelength = 1.0 - 1.4 μm)
Radiance Threshold = Mean + 2.52 σ
Mean = 1799.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 617.70 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.52 σ
Wavelength = 1.0 - 1.4 μm
Mean = 1799.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
σ = 617.70 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS		FREQUENCY
11.0 TO	15.0	22
15.0 TO	20.0	23
20.0 TO	25.0	13
25.0 TO	30.0	9
30.0 TO	35.0	7
35.0 TO	40.0	8
40.0 TO	45.0	7
45.0 TO	50.0	2
50.0 TO	75.0	7
75.0 TO	100.0	4
100.0 TO	150.0	7
150.0 TO	200.0	3
200.0 TO	250.0	1
250.0 TO	300.0	2
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 116

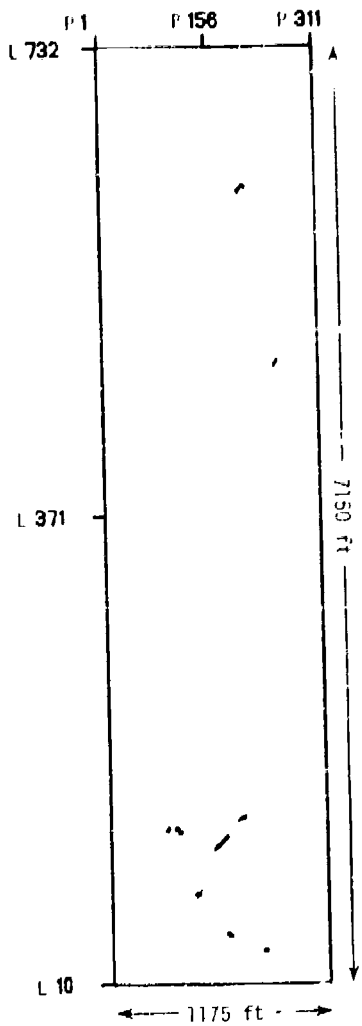
132 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	11
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	16
20 TO 22	65 TO 72	23
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	8
26 TO 28	85 TO 91	4
28 TO 30	91 TO 98	9
30 TO 32	98 TO 104	11
32 TO 39	104 TO 127	9
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	3
55 TO 71	180 TO 232	7
71 TO 100	232 TO 328	9
OVER 100	OVER 328	4

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	17
1.2 TO 1.3	16
1.3 TO 1.4	25
1.4 TO 1.5	17
1.5 TO 1.6	8
1.6 TO 1.7	10
1.7 TO 1.8	5
1.8 TO 1.9	4
1.9 TO 2.0	2
2.0 TO 2.4	9
2.4 TO 2.6	2
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: BLACK HILLS-1 (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 3.00 σ

Mean = 1799.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 617.70 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 1.0 - 1.4 μm

Mean = 1799.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 617.70 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
11.0	TO	15.0	8
15.0	TO	20.0	1
20.0	TO	25.0	2
25.0	TO	30.0	4
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	2
45.0	TO	50.0	0
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	1
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 21

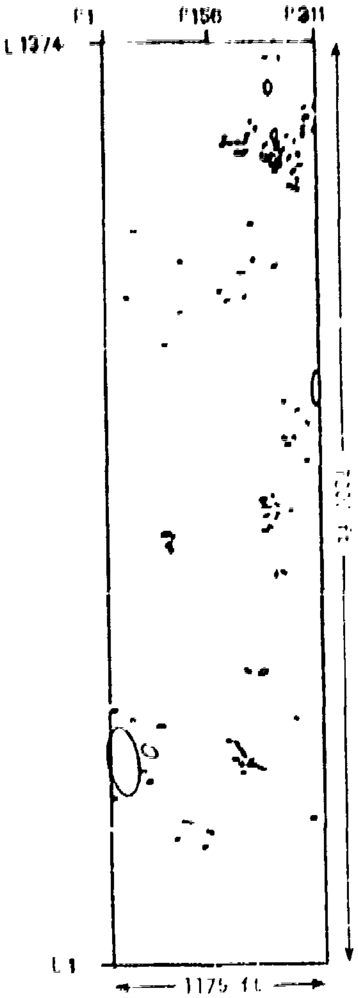
33 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	5
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	1
20	TO	22	65	TO	72	3
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	4
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	1
32	TO	39	104	TO	127	2
39	TO	45	127	TO	147	1
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
	OVER	100		OVER	328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	5
1.2	TO	1.3	0
1.3	TO	1.4	4
1.4	TO	1.5	3
1.5	TO	1.6	2
1.6	TO	1.7	3
1.7	TO	1.8	1
1.8	TO	1.9	1
1.9	TO	2.0	1
2.0	TO	2.4	1
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: BLACK HILLS-1 (Wavelength = 8.0 - 13.5 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 293.95 Kelvin
Std. Dev. = σ = 2.38 Kelvin
EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ
Wavelength = 8.0 - 13.5 μm
Mean = 293.95 Kelvin
σ = 2.38 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	0
10.0 TO	15.0	62
15.0 TO	20.0	31
20.0 TO	25.0	29
25.0 TO	30.0	11
30.0 TO	35.0	13
35.0 TO	40.0	0
40.0 TO	45.0	8
45.0 TO	50.0	7
50.0 TO	75.0	17
75.0 TO	100.0	11
100.0 TO	150.0	6
150.0 TO	200.0	2
200.0 TO	250.0	4
250.0 TO	300.0	1
300.0 TO	400.0	0
400.0 TO	500.0	1
OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 214

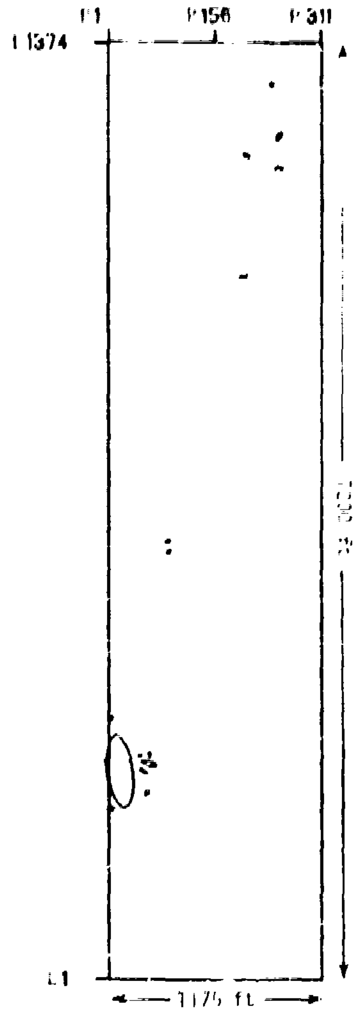
291 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	4
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	40
17 TO 20	55 TO 65	35
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	25
24 TO 26	78 TO 85	14
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	19
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	24
39 TO 45	127 TO 147	7
45 TO 55	147 TO 180	20
55 TO 71	180 TO 232	11
71 TO 100	232 TO 328	8
OVER 100	OVER 328	11

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	11
1.2 TO 1.3	16
1.3 TO 1.4	29
1.4 TO 1.5	37
1.5 TO 1.6	32
1.6 TO 1.7	25
1.7 TO 1.8	20
1.8 TO 1.9	12
1.9 TO 2.0	8
2.0 TO 2.4	15
2.4 TO 2.6	2
2.6 TO 2.8	2
2.8 TO 3.0	0
3.0 TO 3.5	2
3.5 TO 4.0	3
4.0 TO 4.5	0
OVER 4.5	0



Area: BLACK HILLS-1 (Wavelength = 8.0 - 13.5 μm)
Temperature Threshold = Mean + 3.50 σ
Mean = 293.95 Kelvin
Std. Dev. = σ = 2.38 Kelvin
EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.50 σ

Wavelength = 8.0 - 13.5 μm

Mean = 293.95 Kelvin

σ = 2.38 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	0
10.0 TO	15.0	7
15.0 TO	20.0	5
20.0 TO	25.0	1
25.0 TO	30.0	2
30.0 TO	35.0	3
35.0 TO	40.0	2
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	4
75.0 TO	100.0	0
100.0 TO	150.0	1
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 28

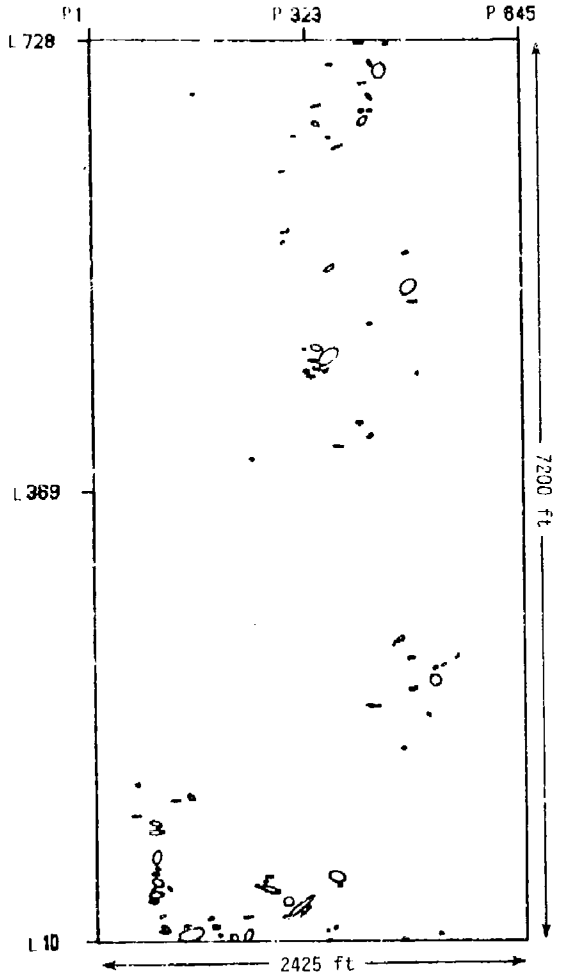
47 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	2
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	2
17 TO	20	55 TO	65	3
20 TO	22	65 TO	72	0
22 TO	24	72 TO	78	3
24 TO	26	78 TO	85	3
26 TO	28	85 TO	91	0
28 TO	30	91 TO	98	2
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	3
39 TO	45	127 TO	147	2
45 TO	55	147 TO	180	3
55 TO	71	180 TO	232	2
71 TO	100	232 TO	328	1
OVER	100	OVER	328	2

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	2
1.2 TO 1.3	1
1.3 TO 1.4	3
1.4 TO 1.5	4
1.5 TO 1.6	1
1.6 TO 1.7	2
1.7 TO 1.8	2
1.8 TO 1.9	4
1.9 TO 2.0	2
2.0 TO 2.4	5
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	2
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: BLACK HILLS-2 (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 2.42 σ

Mean = 1602.71 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 463.80 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

BY AREA

SQUARE METERS			FREQUENCY
11.0	TO	15.0	30
15.0	TO	20.0	20
20.0	TO	25.0	6
25.0	TO	30.0	7
30.0	TO	35.0	6
35.0	TO	40.0	6
40.0	TO	45.0	7
45.0	TO	50.0	1
50.0	TO	75.0	16
75.0	TO	100.0	12
100.0	TO	150.0	9
150.0	TO	200.0	4
200.0	TO	250.0	2
250.0	TO	300.0	1
300.0	TO	400.0	5
400.0	TO	500.0	3
	OVER	500.0	8

Threshold = Mean + 2.42 σ

Wavelength = 1.0 - 1.4 μm

Mean = 1602.71 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 463.80 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

TOTAL NUMBER OF ELLIPTICAL AREAS = 143

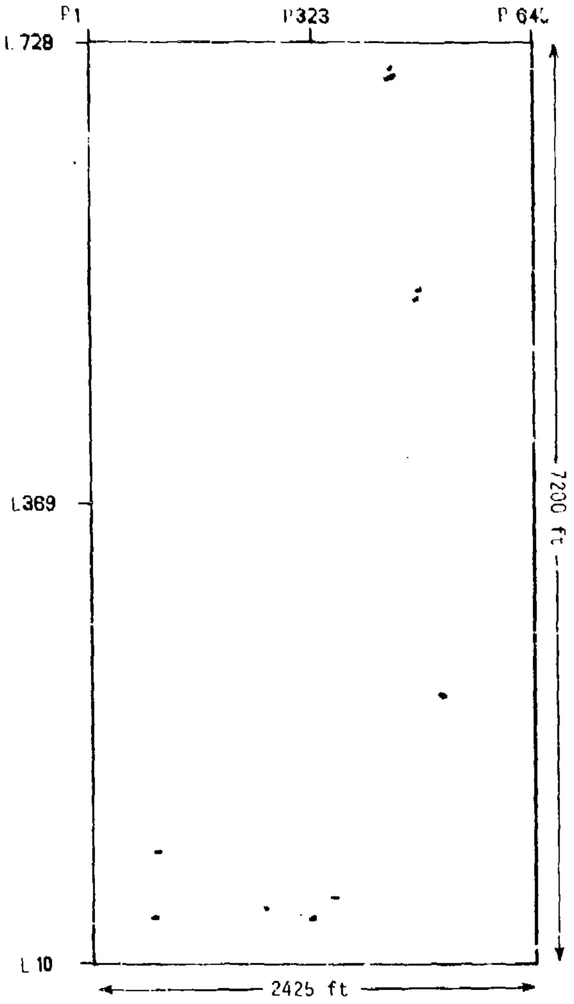
50 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	27
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	16
20	TO	22	65	TO	72	6
22	TO	24	72	TO	78	4
24	TO	26	78	TO	85	8
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	7
30	TO	32	98	TO	104	6
32	TO	39	104	TO	127	14
39	TO	45	127	TO	147	6
45	TO	55	147	TO	180	11
55	TO	71	180	TO	232	13
71	TO	100	232	TO	328	4
OVER		100	OVER		328	20

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	27
1.2	TO	1.3	25
1.3	TO	1.4	23
1.4	TO	1.5	13
1.5	TO	1.6	10
1.6	TO	1.7	12
1.7	TO	1.8	7
1.8	TO	1.9	4
1.9	TO	2.0	4
2.0	TO	2.4	11
2.4	TO	2.6	2
2.6	TO	2.8	3
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	0
4.0	TO	4.5	1
	OVER	4.5	0



Area: BLACK HILLS-2 (Wavelength = 1.0 - 1.4 μm)
Radiance Threshold = Mean + 3.29 σ
Mean = 1602.71 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 463.80 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

ERIM

BLACK HILLS-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.29 σ

Wavelength = 1.0 - 1.4 μm

Mean = 1602.71 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 463.80 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS		FREQUENCY
11.0 TO	15.0	1
15.0 TO	20.0	2
20.0 TO	25.0	1
25.0 TO	30.0	1
30.0 TO	35.0	1
35.0 TO	40.0	0
40.0 TO	45.0	2
45.0 TO	50.0	0
50.0 TO	75.0	2
75.0 TO	100.0	1
100.0 TO	150.0	1
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 13

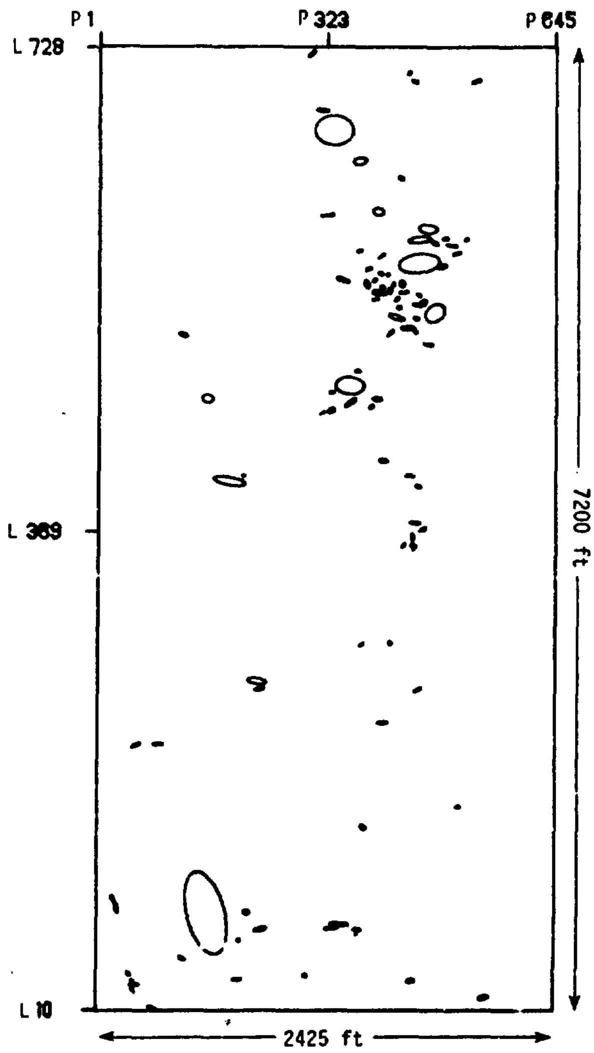
6 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	3
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	1
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	1
32 TO 39	104 TO 127	3
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	2
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	4
1.3 TO 1.4	4
1.4 TO 1.5	2
1.5 TO 1.6	1
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	0
1.9 TO 2.0	1
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: BLACK HILLS-2 (Wavelength = 1.5 - 1.8 μm)
Radiance Threshold = Mean + 2.82 σ
Mean = 447.21 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 154.85 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.82 σ

Wavelength = 1.5 - 1.8 μm

Mean = 447.21 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 154.85 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
11.0	TO	15.0	23
15.0	TO	20.0	9
20.0	TO	25.0	11
25.0	TO	30.0	4
30.0	TO	35.0	11
35.0	TO	40.0	3
40.0	TO	45.0	1
45.0	TO	50.0	8
50.0	TO	75.0	19
75.0	TO	100.0	11
100.0	TO	150.0	17
150.0	TO	200.0	2
200.0	TO	250.0	3
250.0	TO	300.0	1
300.0	TO	400.0	3
400.0	TO	500.0	1
	OVER	500.0	8

TOTAL NUMBER OF ELLIPTICAL AREAS = 135

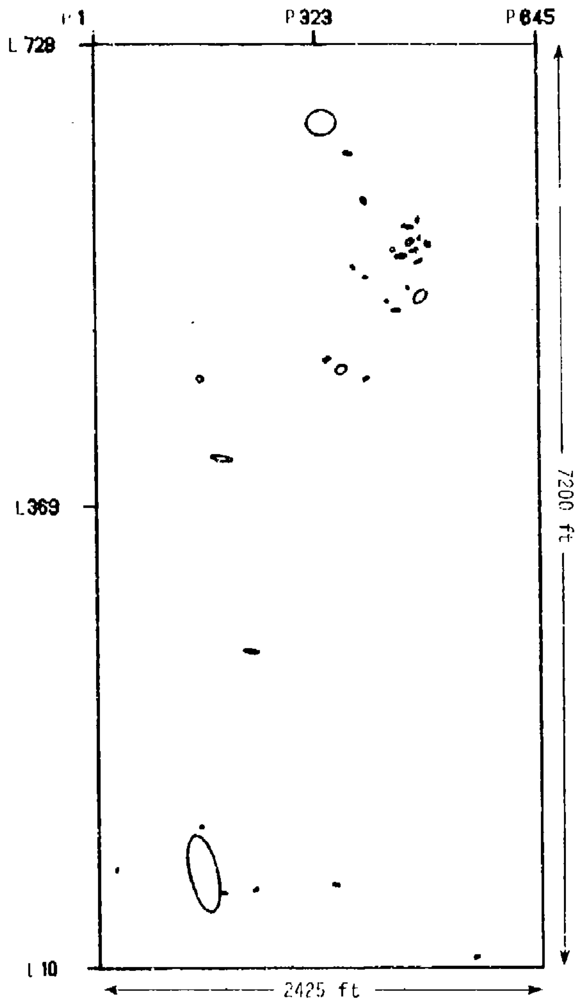
46 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	22
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	8
20	TO	22	65	TO	72	5
22	TO	24	72	TO	78	3
24	TO	26	78	TO	85	11
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	5
30	TO	32	98	TO	104	7
32	TO	39	104	TO	127	10
39	TO	45	127	TO	147	8
45	TO	55	147	TO	180	14
55	TO	71	180	TO	232	15
71	TO	100	232	TO	328	12
	OVER	100		OVER	328	15

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	22
1.2	TO	1.3	20
1.3	TO	1.4	11
1.4	TO	1.5	16
1.5	TO	1.6	14
1.6	TO	1.7	14
1.7	TO	1.8	9
1.8	TO	1.9	9
1.9	TO	2.0	2
2.0	TO	2.4	11
2.4	TO	2.6	3
2.6	TO	2.8	1
2.8	TO	3.0	1
3.0	TO	3.5	0
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	1



Area: BLACK HILLS-2 (Wavelength = 1.5 - 1.8 μm)

Radiance Threshold = Mean + 3.18 σ

Mean = 447.21 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 154.85 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

BLACK HILLS-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.18 σ

Wavelength = 1.5 - 1.8 μm

Mean = 447.21 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 154.85 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS		FREQUENCY
11.0 TO	15.0	9
15.0 TO	20.0	6
20.0 TO	25.0	4
25.0 TO	30.0	2
30.0 TO	35.0	3
35.0 TO	40.0	2
40.0 TO	45.0	2
45.0 TO	50.0	0
50.0 TO	75.0	6
75.0 TO	100.0	2
100.0 TO	150.0	2
150.0 TO	200.0	3
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	2
OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 47

31 FEATURES WITH AREAS LESS THAN11.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	6
16 TO	17	52 TO	55	0
17 TO	20	55 TO	65	8
20 TO	22	65 TO	72	0
22 TO	24	72 TO	78	3
24 TO	26	78 TO	85	4
26 TO	28	85 TO	91	1
28 TO	30	91 TO	98	2
30 TO	32	98 TO	104	1
32 TO	39	104 TO	127	4
39 TO	45	127 TO	147	3
45 TO	55	147 TO	180	4
55 TO	71	180 TO	232	1
71 TO	100	232 TO	328	4
OVER	100	OVER	328	6

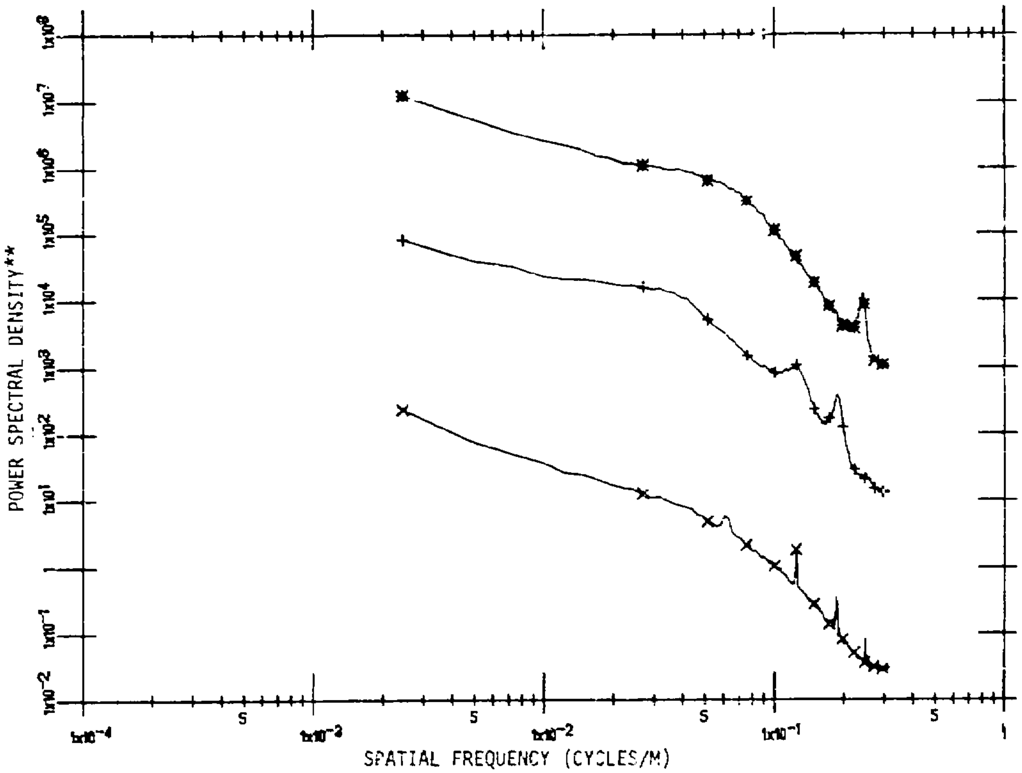
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	7
1.2 TO 1.3	9
1.3 TO 1.4	7
1.4 TO 1.5	3
1.5 TO 1.6	6
1.6 TO 1.7	3
1.7 TO 1.8	3
1.8 TO 1.9	2
1.9 TO 2.0	1
2.0 TO 2.4	4
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

BLACK HILLS, SOUTH DAKOTA

Power Spectra

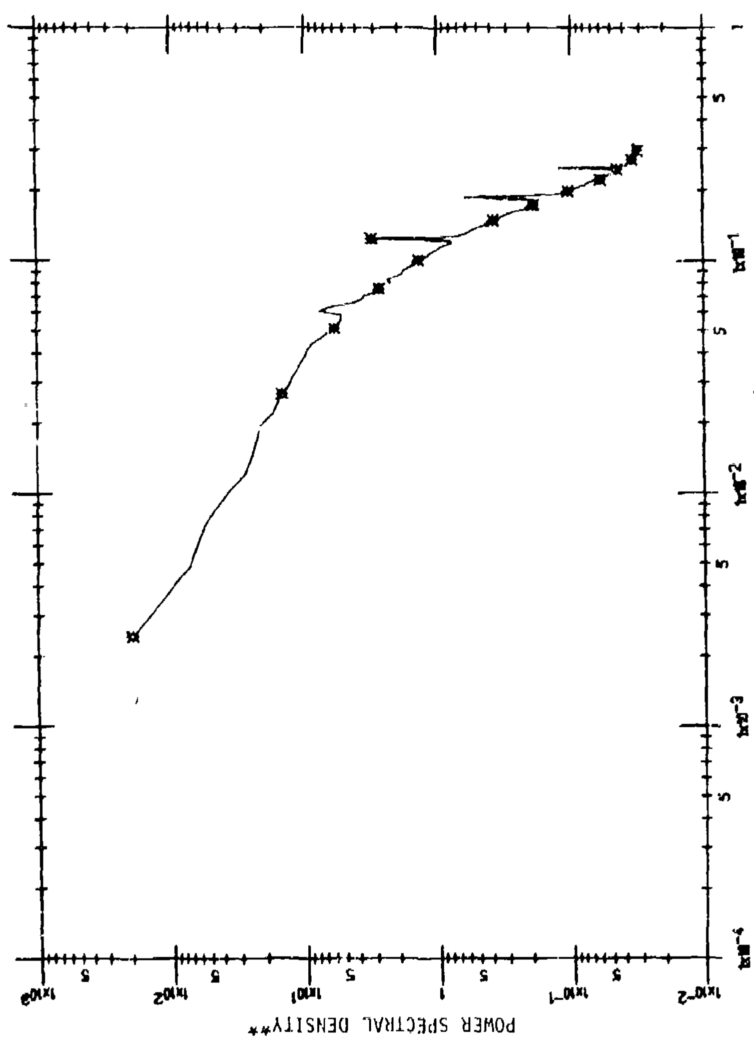
Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 13.5 μm



Area: BLACK HILLS-1 CROSS-TRACK Wavelength = 1.0-1.4 (*), 2.0-2.6 (+), 4.5-5.5 (X)

POWER SPECTRA

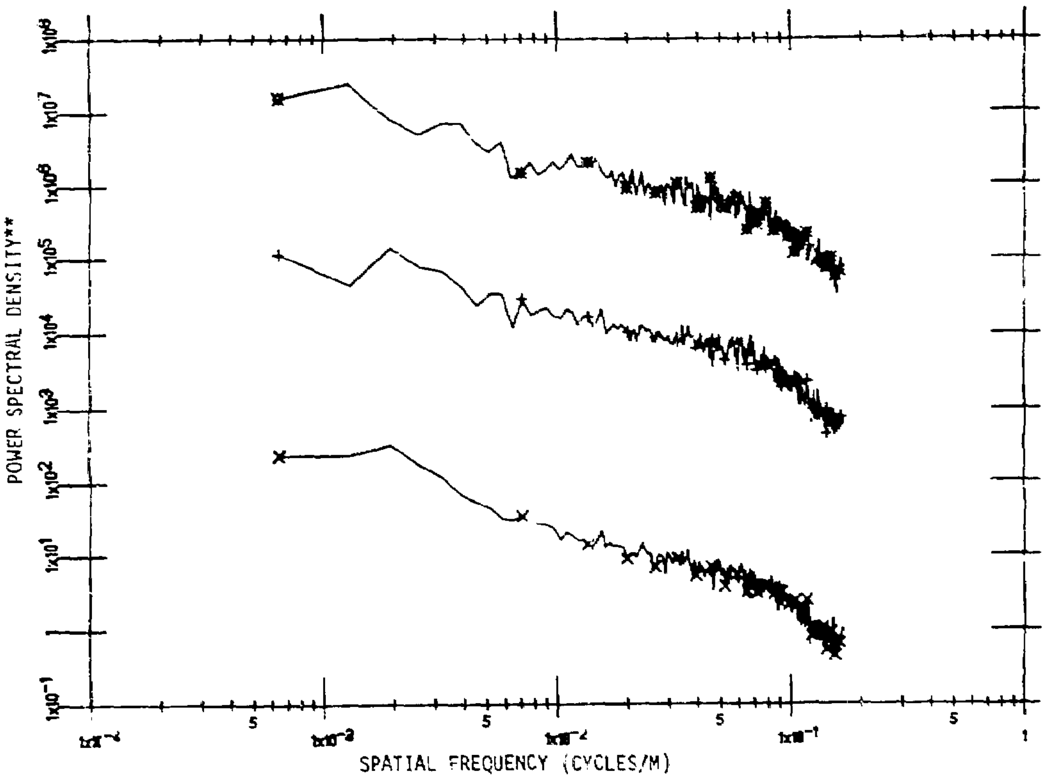
** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 μm and 2.0 to 2.6 μm bands and $(°K)^2$/cycle/meter for 4.5 to 5.5 μm band.



Area: BLACK HILLS-1 CROSS-TRACK Wavelength = 8.0-13.5 (*)

POWER SPECTRA

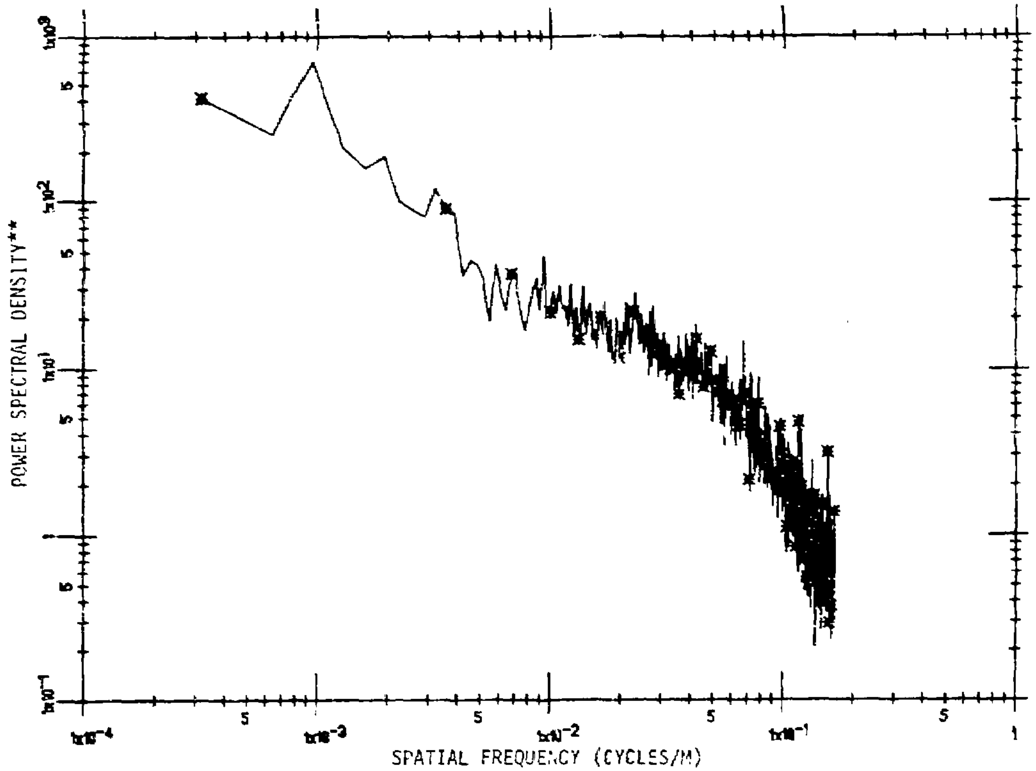
** Power Spectral Density is $(°K)^2$/cycle/meter for 8.0 to 13.5 μm band.



Area: BLACK HILLS-1 IN-TRACK Wavelength = 1.0-1.4 (*), 2.0-2.6 (+), 4.5-5.5 (X)

POWER SPECTRA

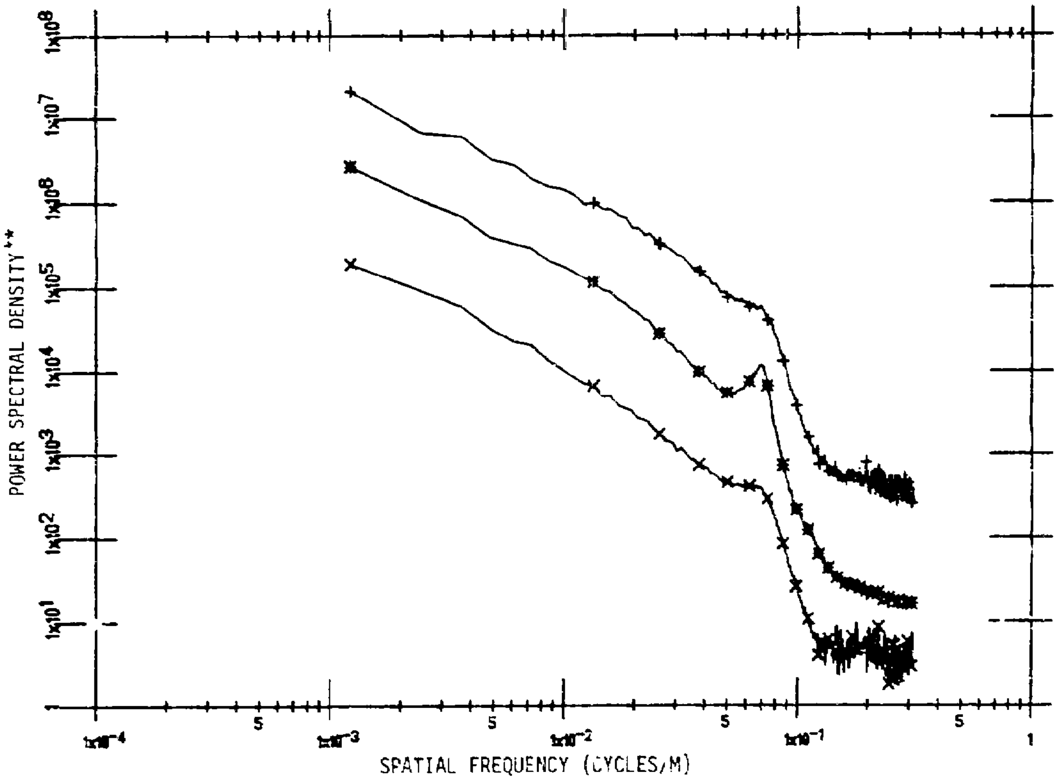
** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 µm and and 2.0 to 2.6 µm bands and $(°K)^2$/cycle/meter for 4.5 to 5.5 µm band.



Area: BLACK HILLS-1 IN-TRACK Wavelength = 8.0-13.5 (*)

POWER SPECTRA

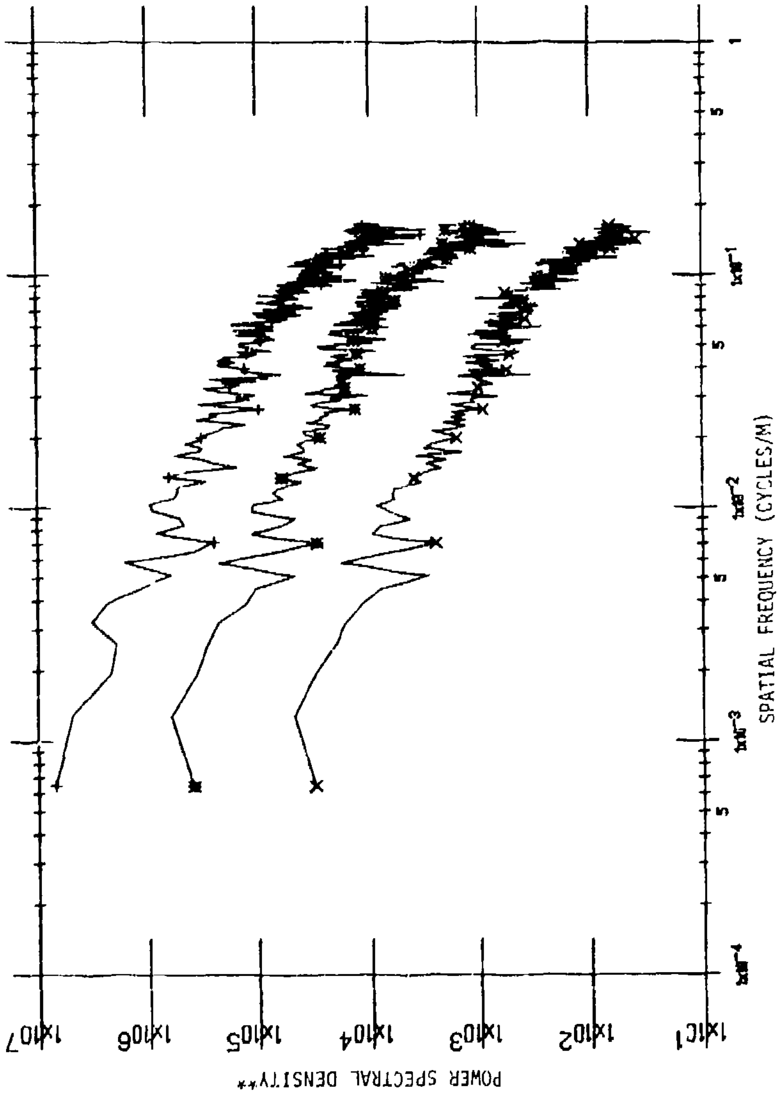
** Power Spectral Density is $(°K)^2$/cycle/meter for 8.0 to 13.5 μm band.



Area: BLACK HILLS-2 CROSS-TRACK Wavelength = 1.0-1.4 (+), 1.5-1.8 (*), 2.0-2.6 (X)

POWER SPECTRA

** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 μm, 1.5 to 1.8 μm and 2.0 to 2.6 μm bands.



Area: BLACK HILLS-2 IN-TRACK Wavelength = 1.0-1.4 (+), 1.5-1.8 (*), 2.0-2.6 (X)

POWER SPECTRA

** Power Spectral Density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4 μm, 1.5 to 1.8 μm and 2.0 to 2.6 μm bands.

CAMP A.P. HILL, VIRGINIA*

Pertinent Scene and Flight Information

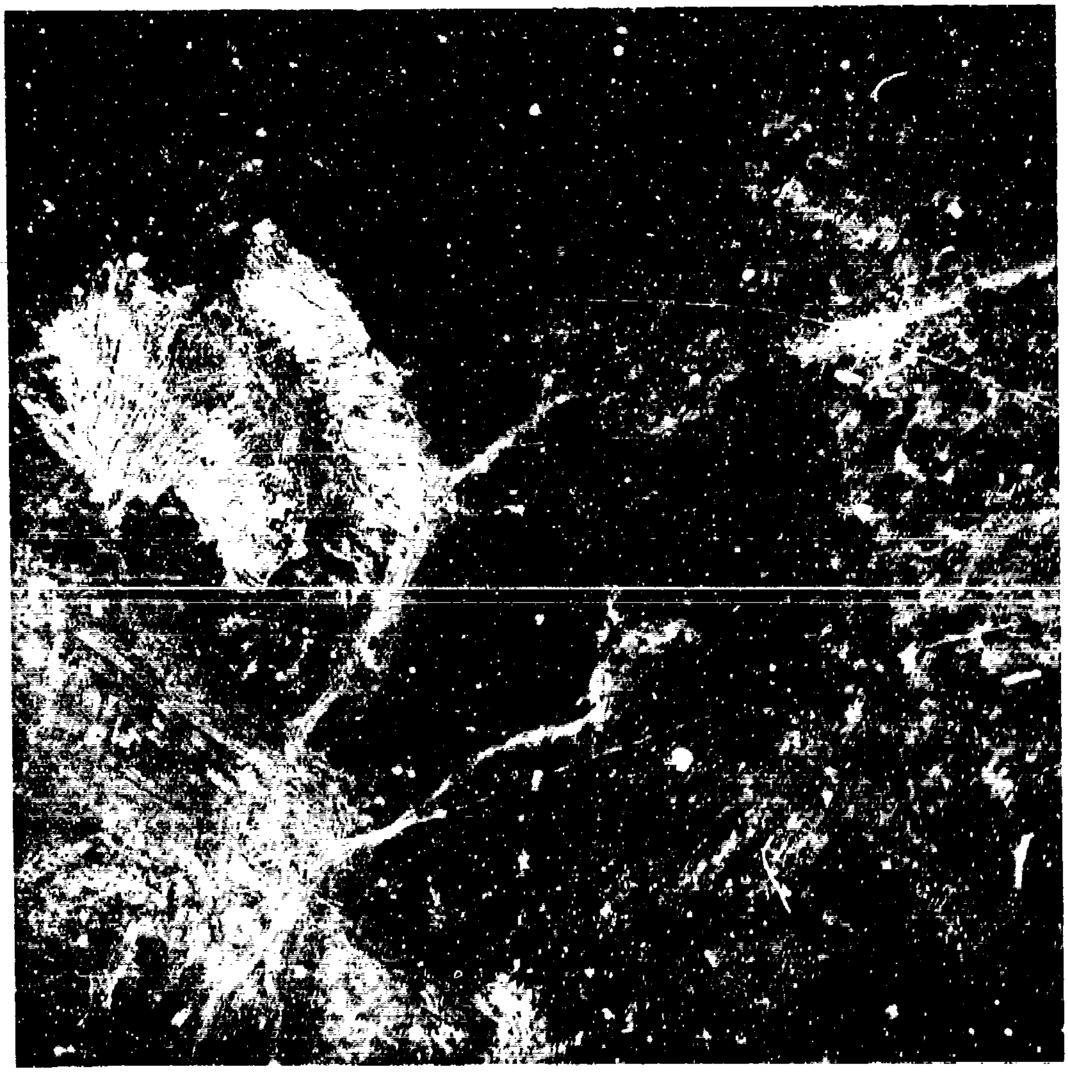
(Dates of Flights: 28,29,30 March 1978)

*For specific discussions of these and associated data for this scenery refer to Reference 5. Note also that in the A.P. Hill data approximately 10 vehicle targets are located in the area. In the following statistics most of the features remaining above the highest radiance and temperature thresholds are targets.

PERTINENT INFORMATION ABOUT DIURNAL CAMP A.P. HILL, VIRGINIA DATA

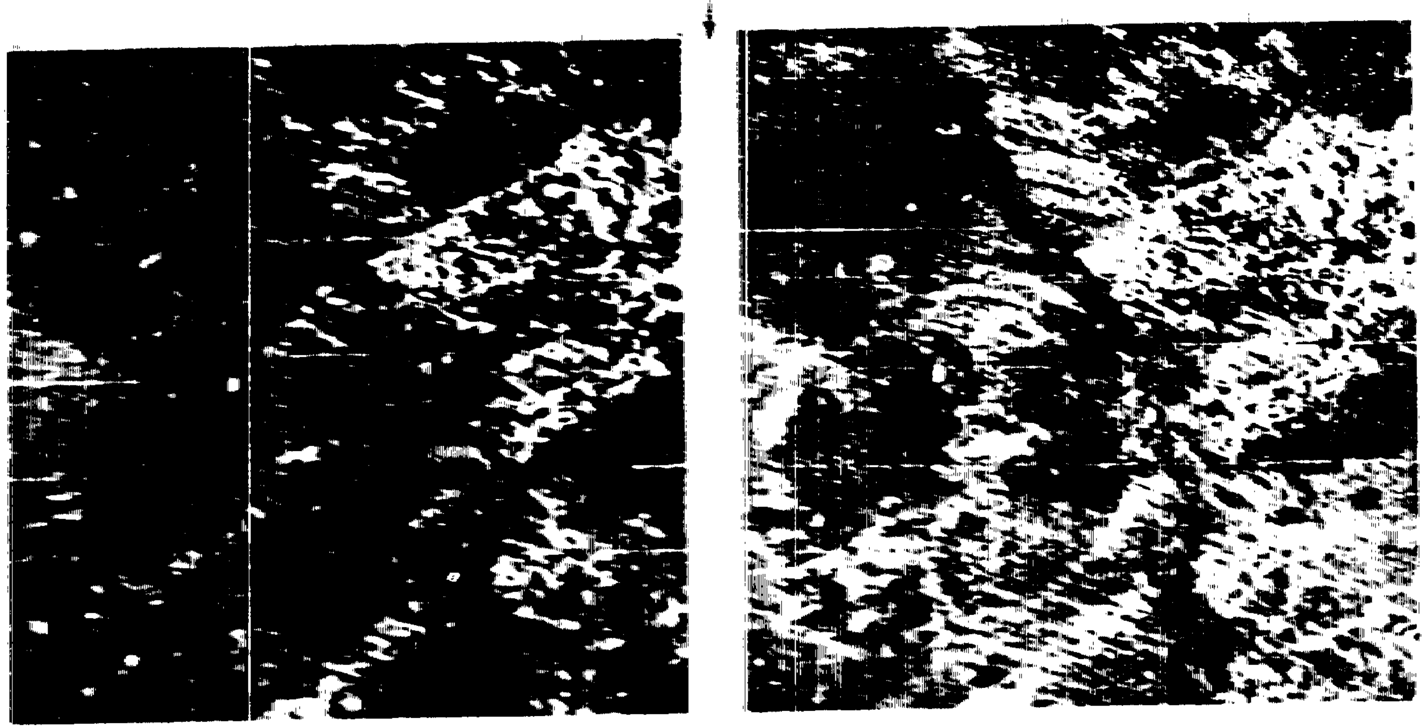
	Morning	Afternoon
Wavelength Bands:	2.0-2.6 μm, 4.5-5.5 μm, 8.0-14.0 μm	2.0-2.6 μm, 4.5-5.5 μm, 8.0-14.0 μm
IFOV:	2.0 mrad	2.0 mrad
Depression Angle:	90°	90°
Altitude:	800 ft	800 ft
Time:	0930 hrs	1330 hrs
Flight Direction:	West	West
Ground Speed:	168 ft-sec^{-1}	168 ft-sec^{-1}
Area Covered (Approx.):	1100 ft long 1400 ft wide	1100 ft long 1400 ft wide
Weather:	Clear	Clear

	Evening	Midnight
Wavelength Bands:	4.5-5.5 μm, 8.0-14.0 μm	4.5-5.5 μm, 8.0-14.0 μm
IFOV:	2.0 mrad	2.0 mrad
Depression Angle:	90°	90°
Altitude:	800 ft	800 ft
Time:	1830 hrs	2330 hrs
Flight Direction:	West	West
Ground Speed:	168 ft-sec^{-1}	168 ft-sec^{-1}
Area Covered (Approx.):	1100 ft long 800 ft wide	1600 ft long 800 ft wide
Weather:	Clear to slight haze	Clear



AERIAL PHOTOGRAPH OF CAMP A. P. HILL TEST AREA. Photo image is reversed left-to-right for compatibility with imagery scan direction.

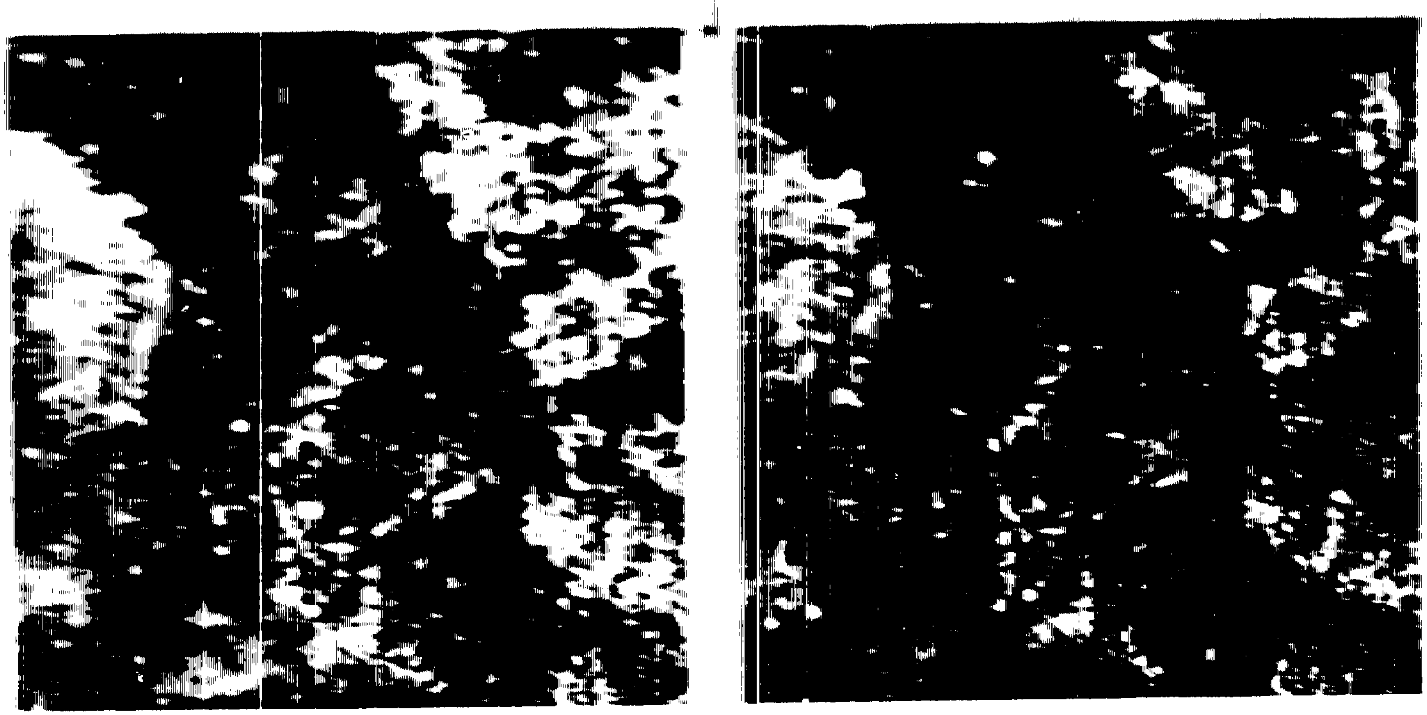
Flight Direction



(a) 4.5 - 5.5 μm [illegible]

(b) 8.0 - 14.0 μm [illegible]

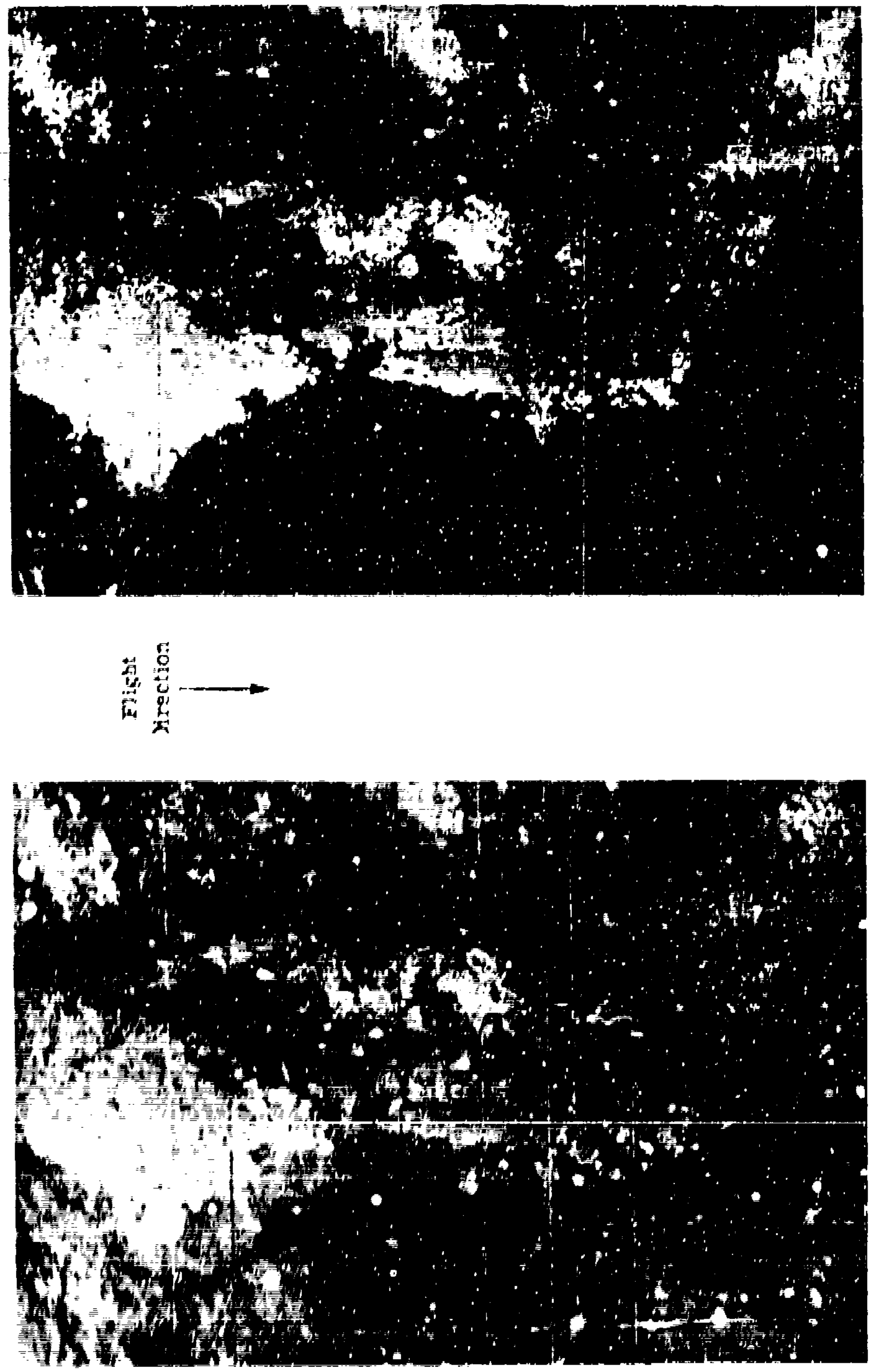
[illegible] - [illegible]



(a) 4.5 - 5.5 µm

(b) 8.0 - 14.0 µm

[illegible] HILL AREA IMAGERY - AFTERNOON

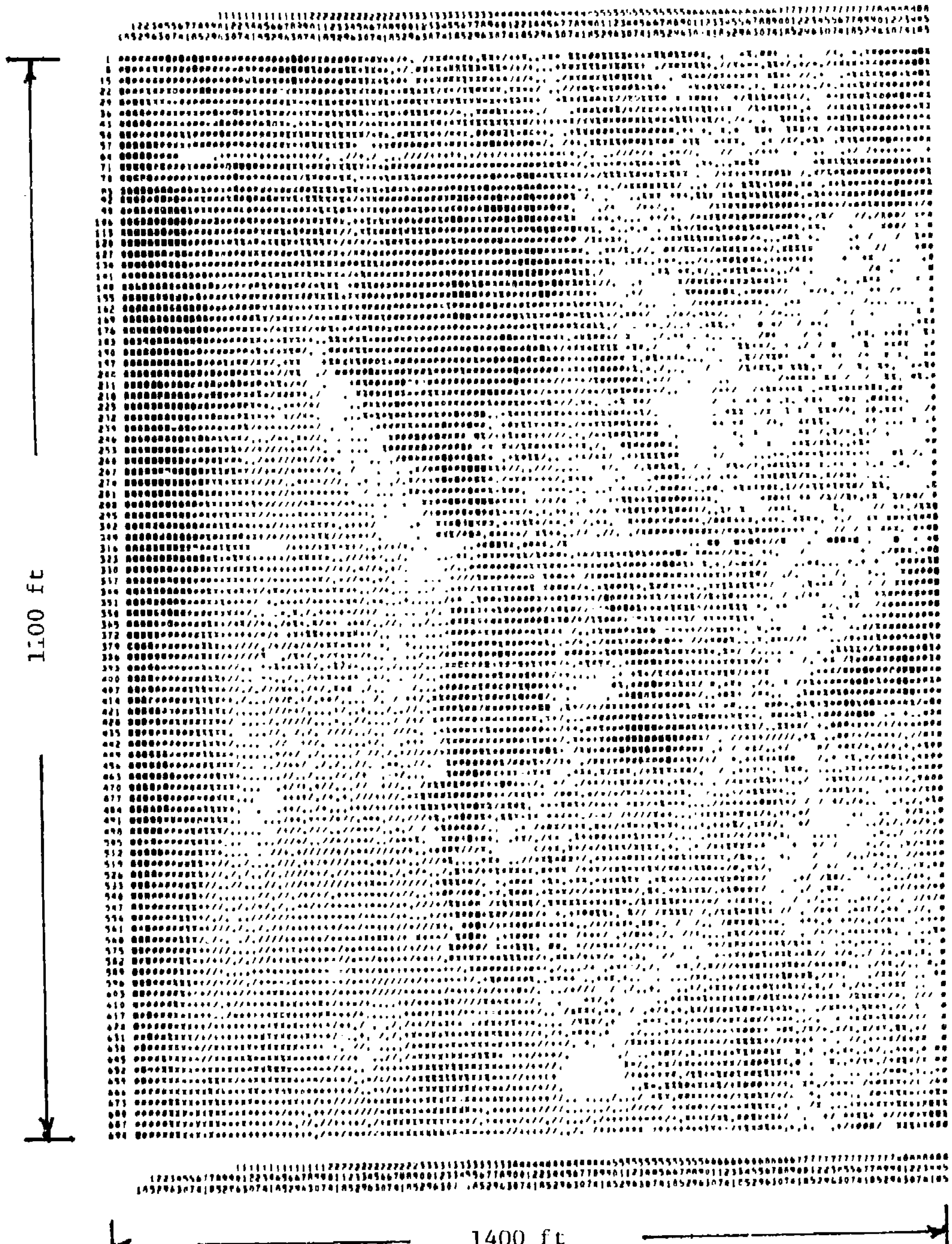


(a) 4.5 - 5.5 µm

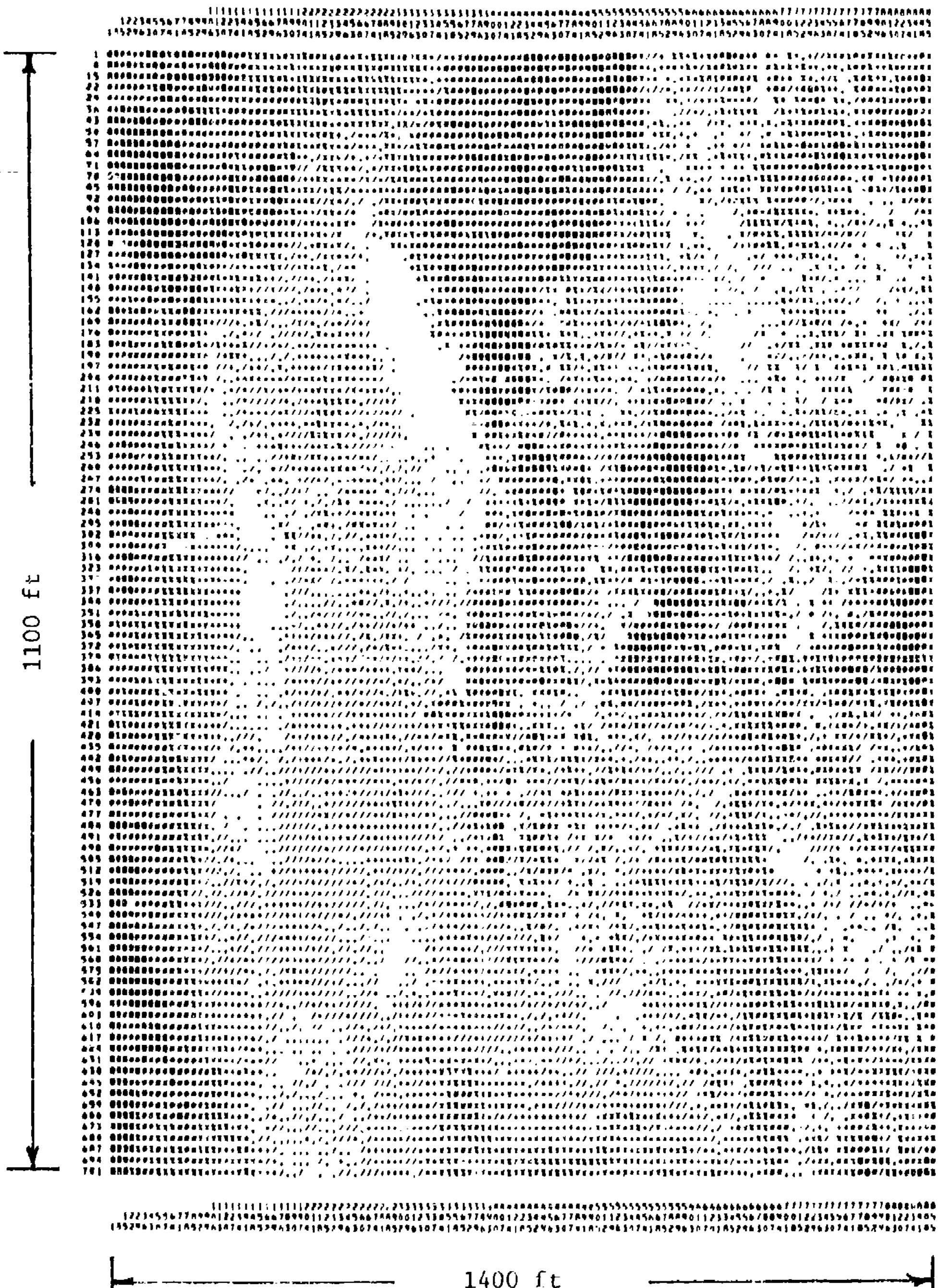
(b) 8.0 - 14.0 µm

CAMP A. P. HILL AREA IMAGERY - MIDNIGHT

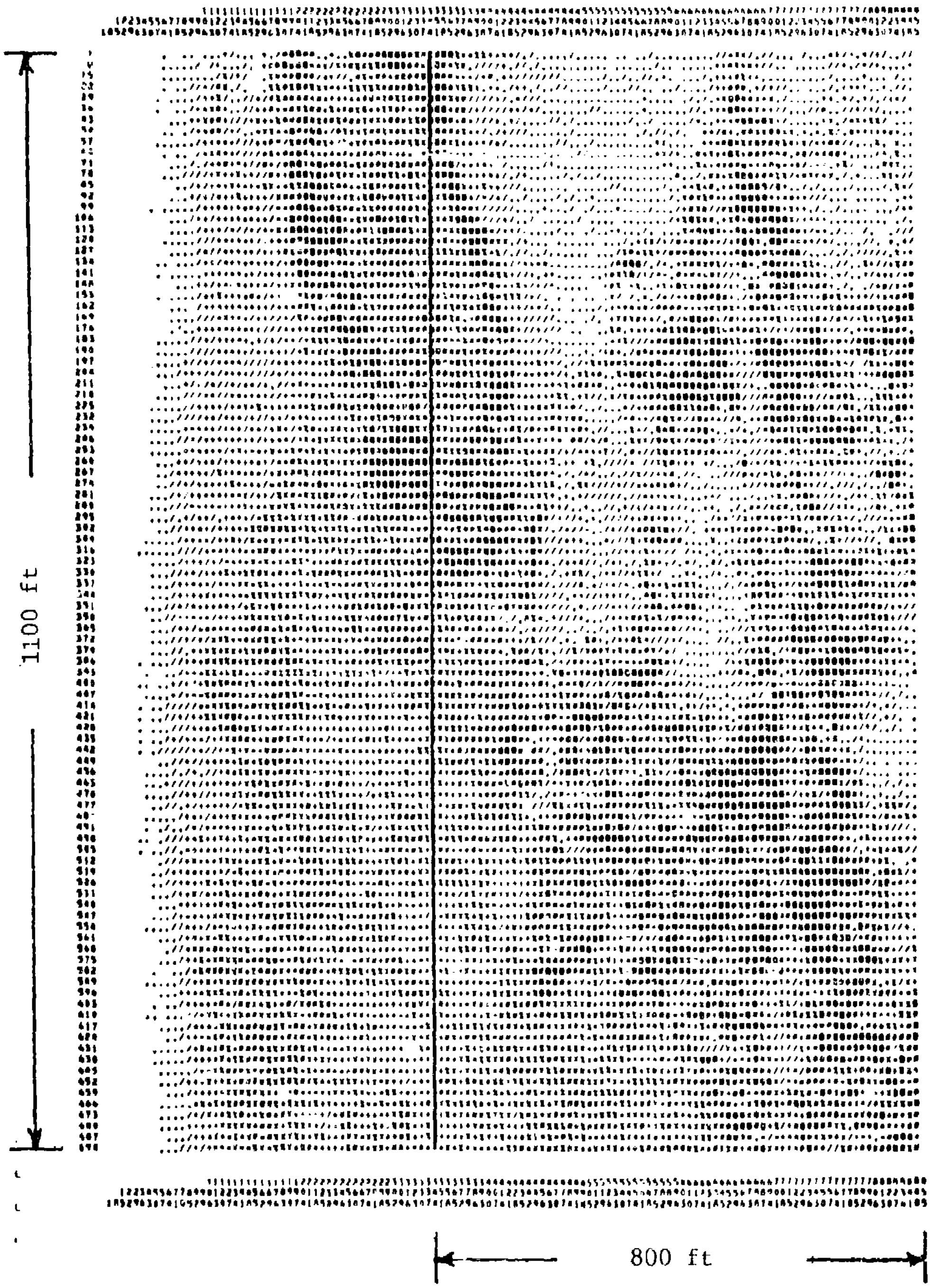
ERIM



GREYMAP OF CAMP A.P. HILL AREA - MORNING
(Time: 0930, Δλ: 4.5-5.5 μm)

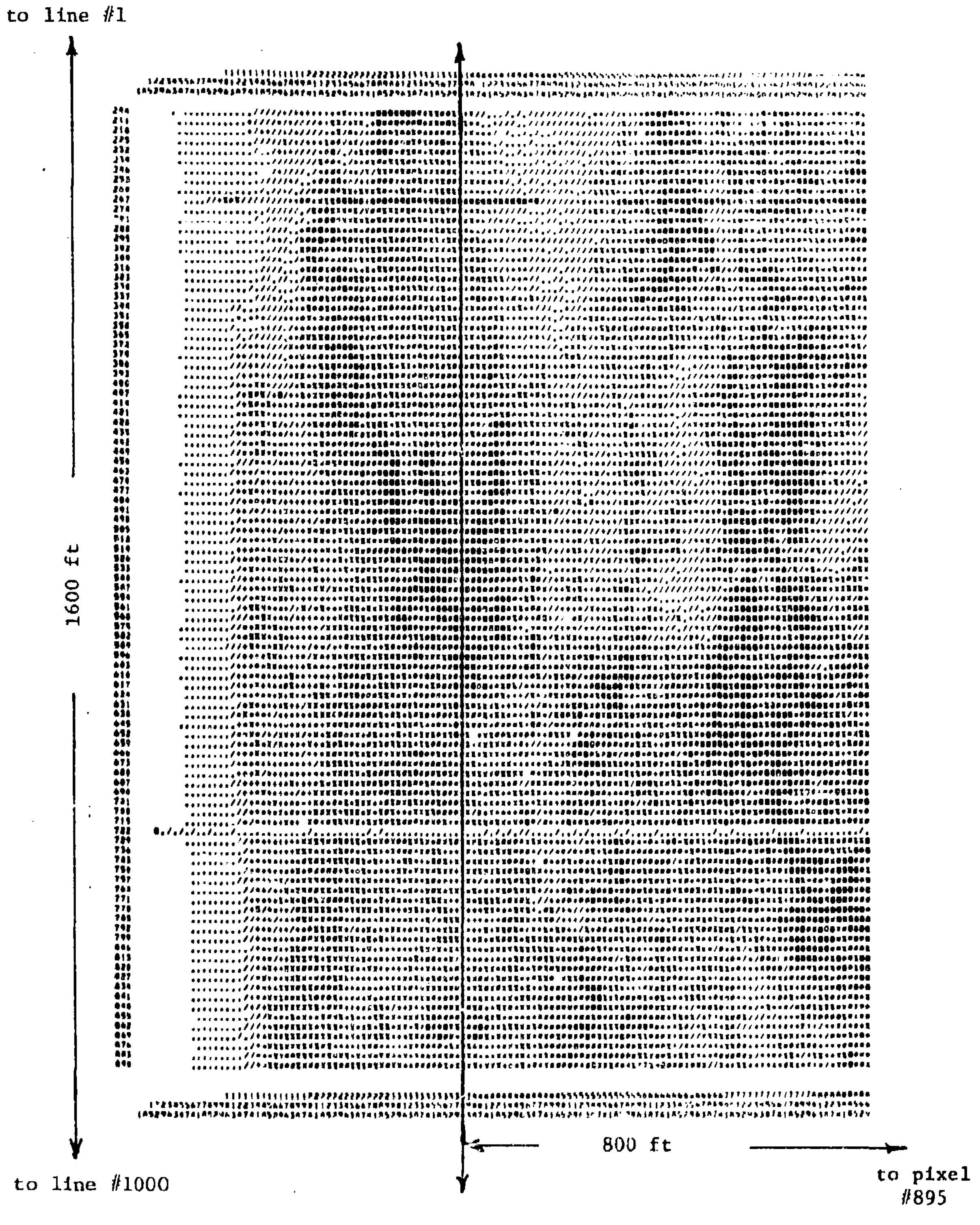


GREYMAP OF CAMP A.P. HILL AREA - AFTERNOON
(Time: 1330, Δλ: 4.5-5.5 μm)



Note: Because of vignetting on the left side, only that portion starting with pixel #344 was used.

GREYMAP OF CAMP A.P. HILL AREA - EVENING
(Time: 1830, $\Delta\lambda$: 4.5-5.5 μm)



Note: Because of vignetting on the left side, only that portion starting with pixel #384 was used.

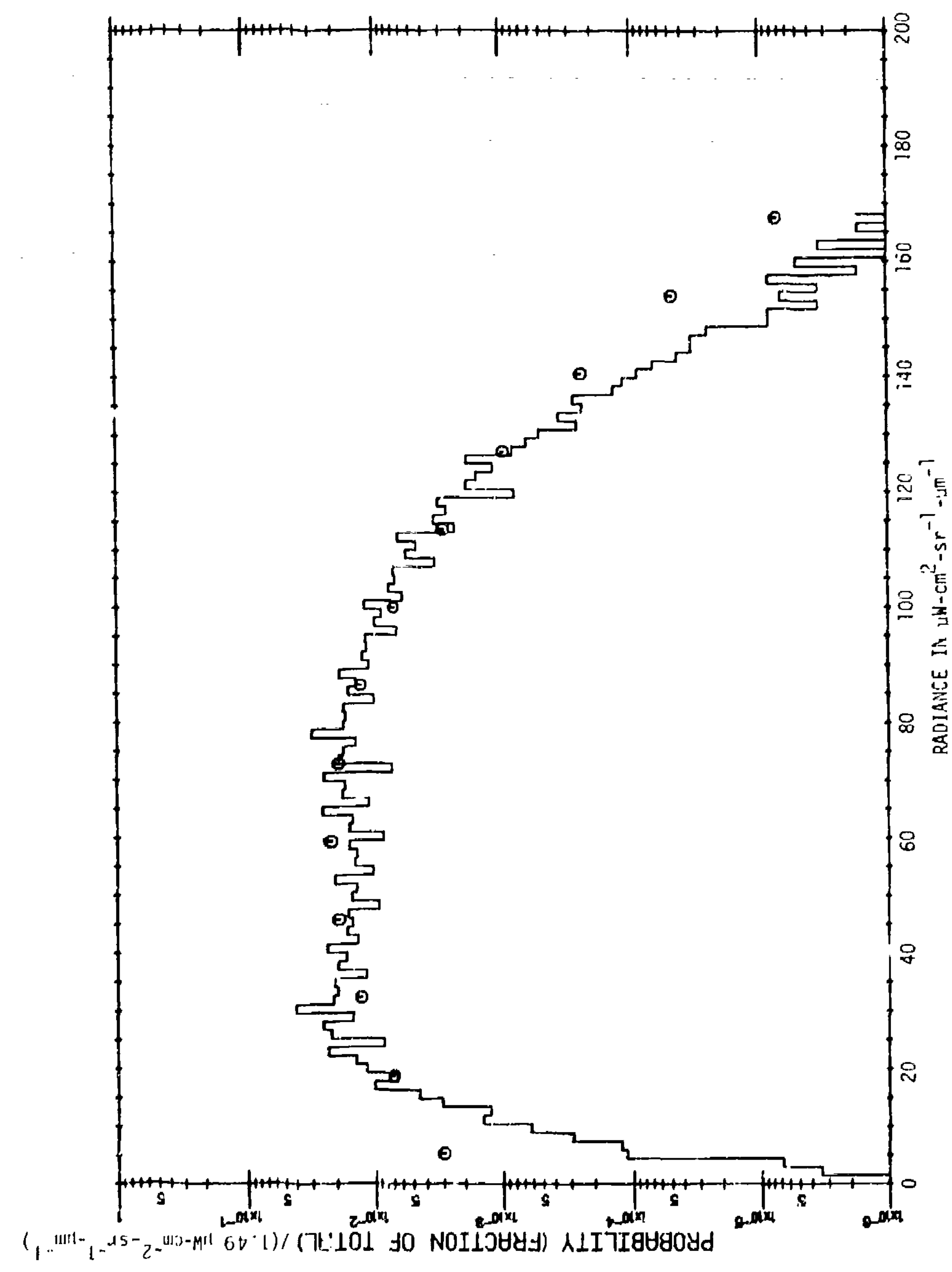
GREYMAP OF CAMP A.P. HILL AREA - MIDNIGHT
(Time: 2330, $\Delta\lambda$: 4.5-5.5 μm)

CAMP A. P. HILL, VIRGINIA

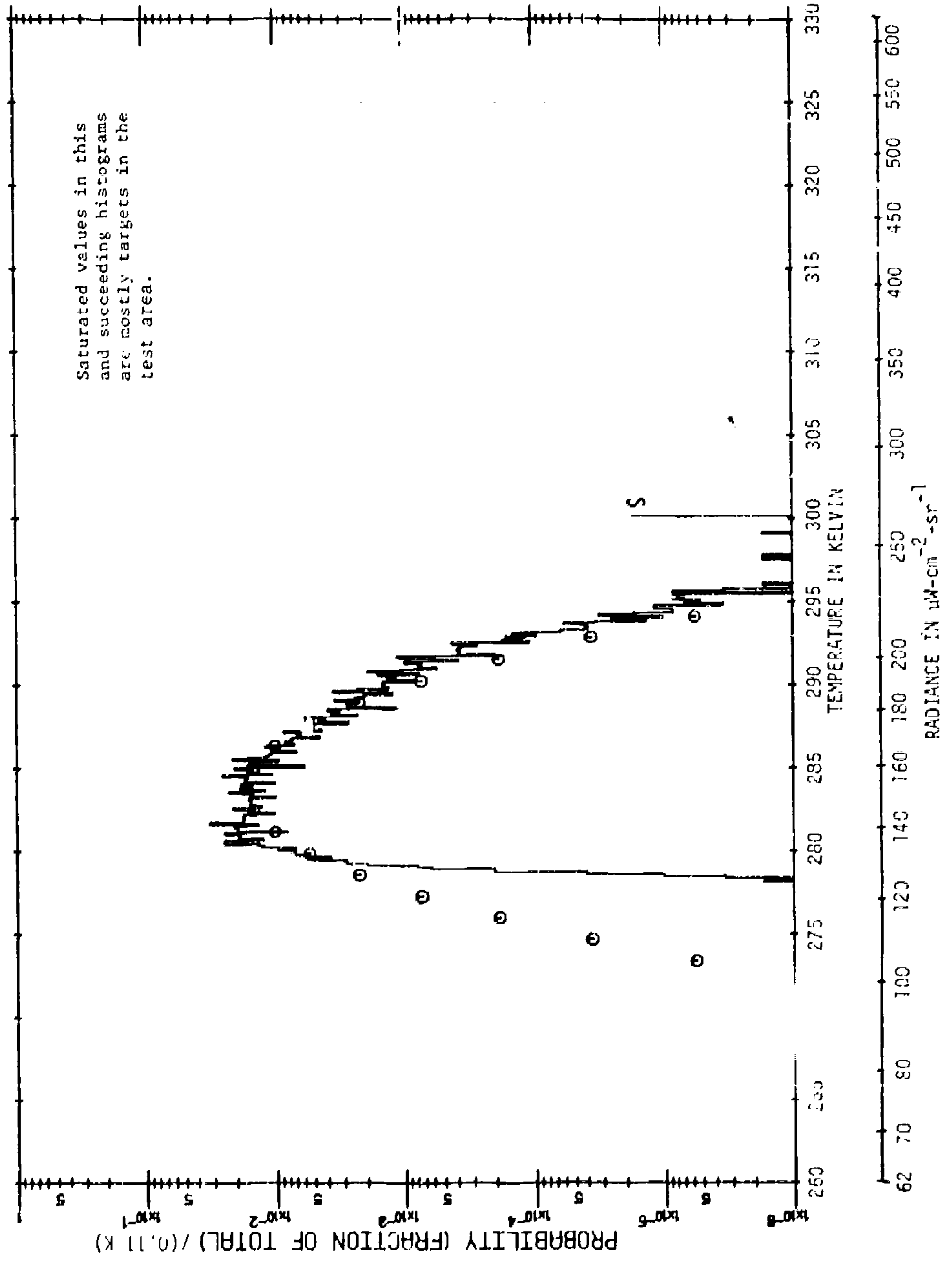
Histograms*

Spectral Bands: 2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 14.0 μm

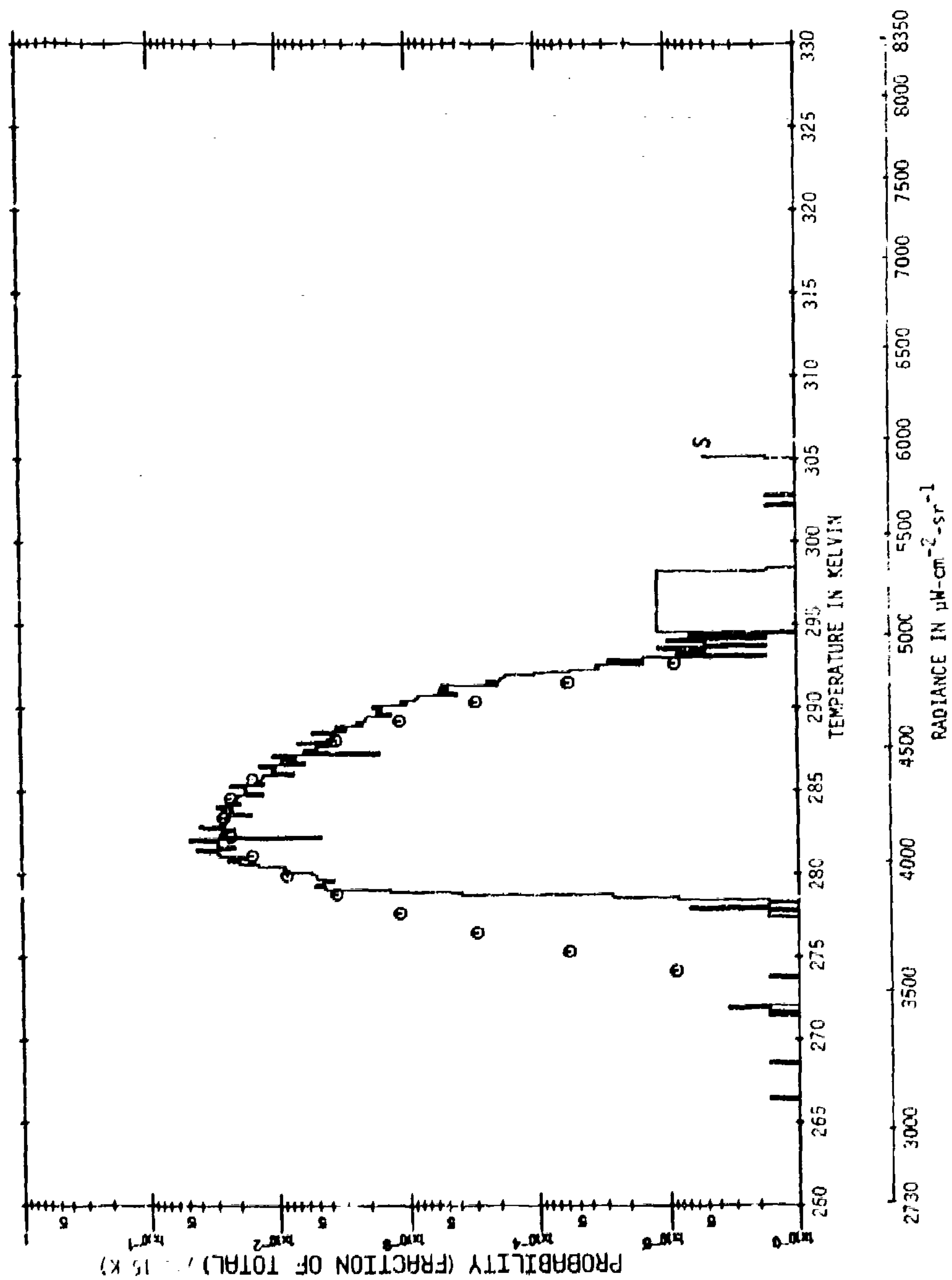
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



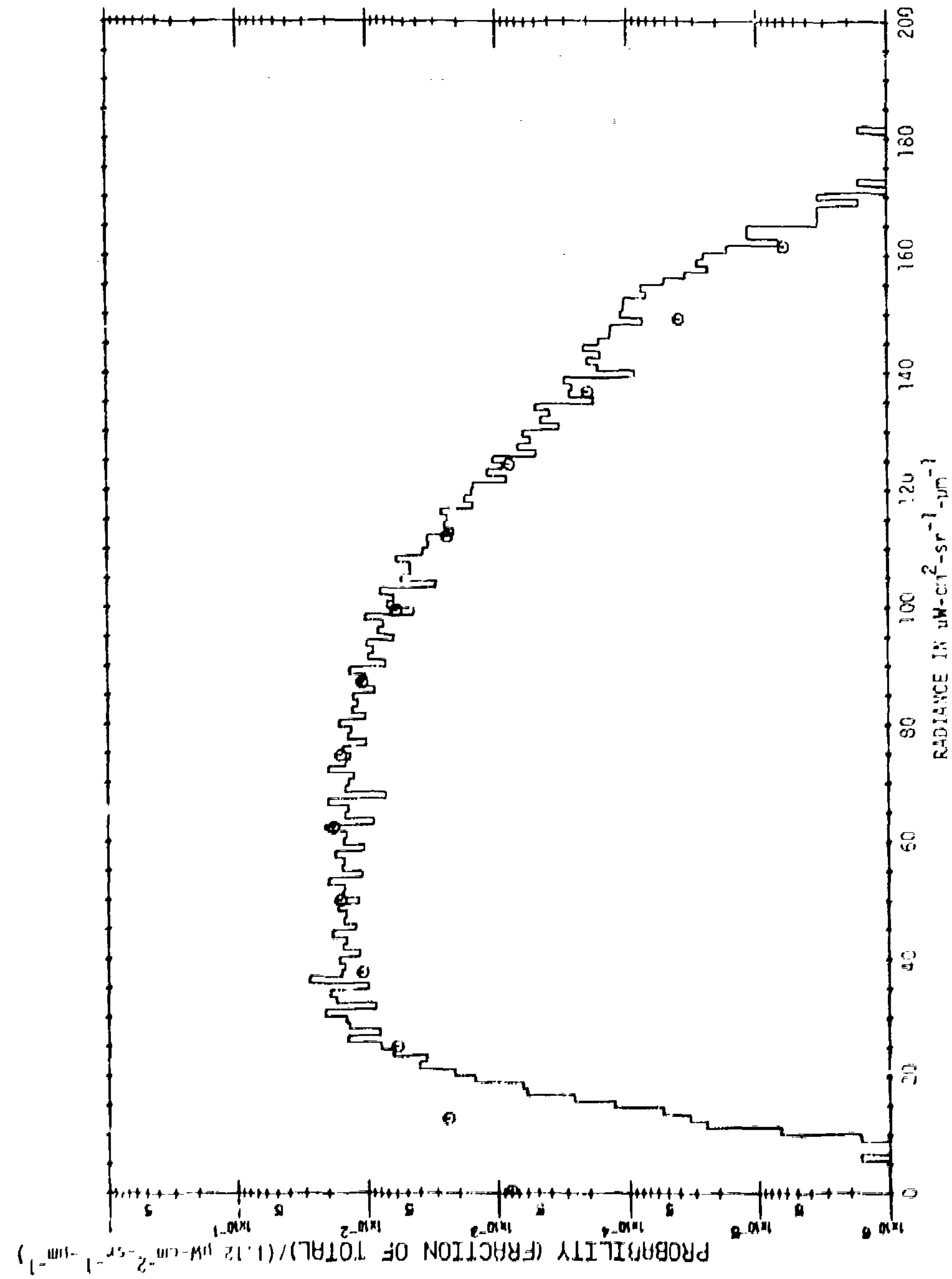
Area: Camp A.P. Hill - Morning Wavelength = 2.0 - 2.6 um
Mean = 59.36
Std. Dev. = 27.03



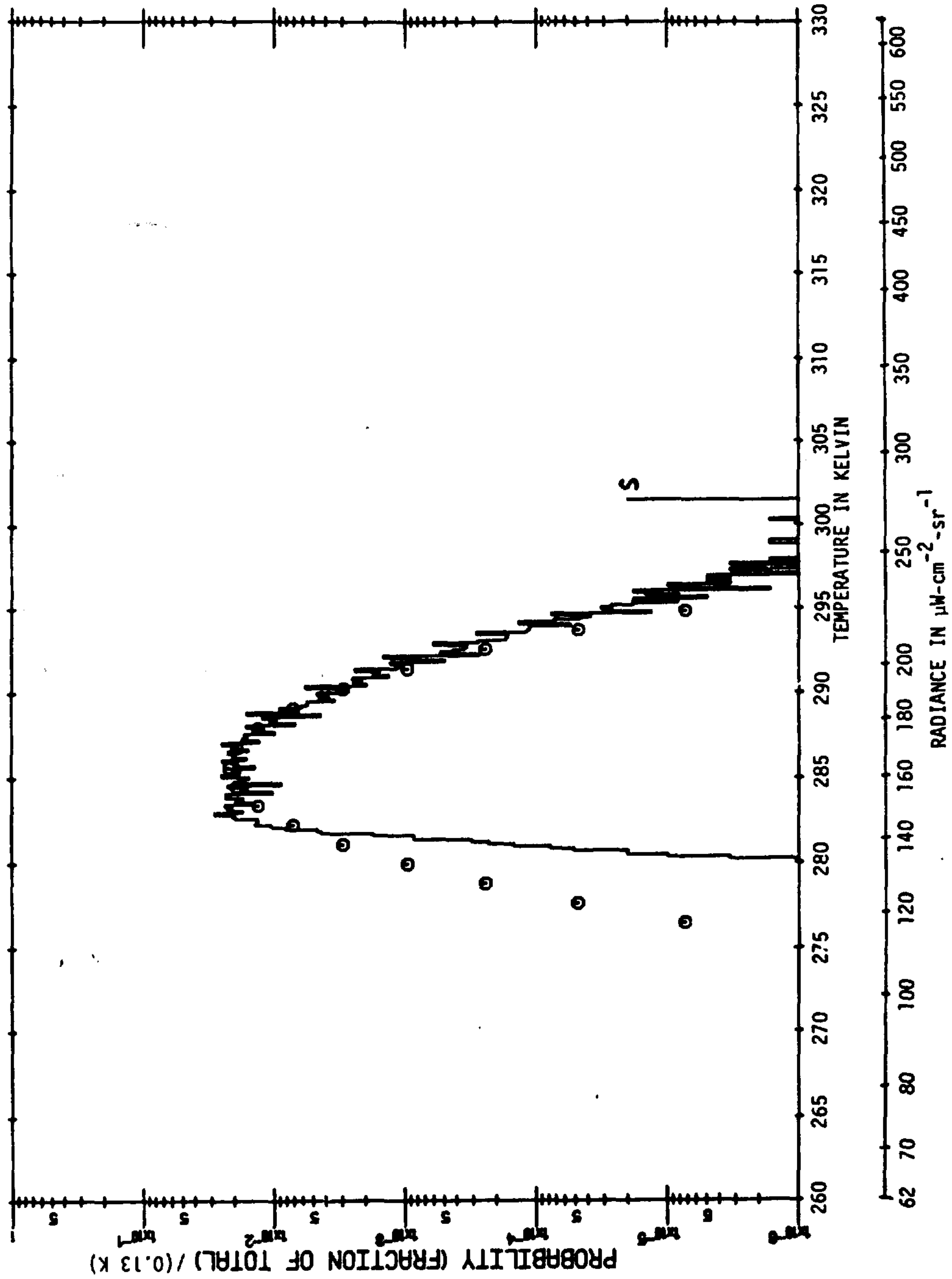
Area: Camp A.P. Hill - Morning Wavelength = 4.5 - 5.5 µm
Mean = 283.77
Std. Dev. = 2.59



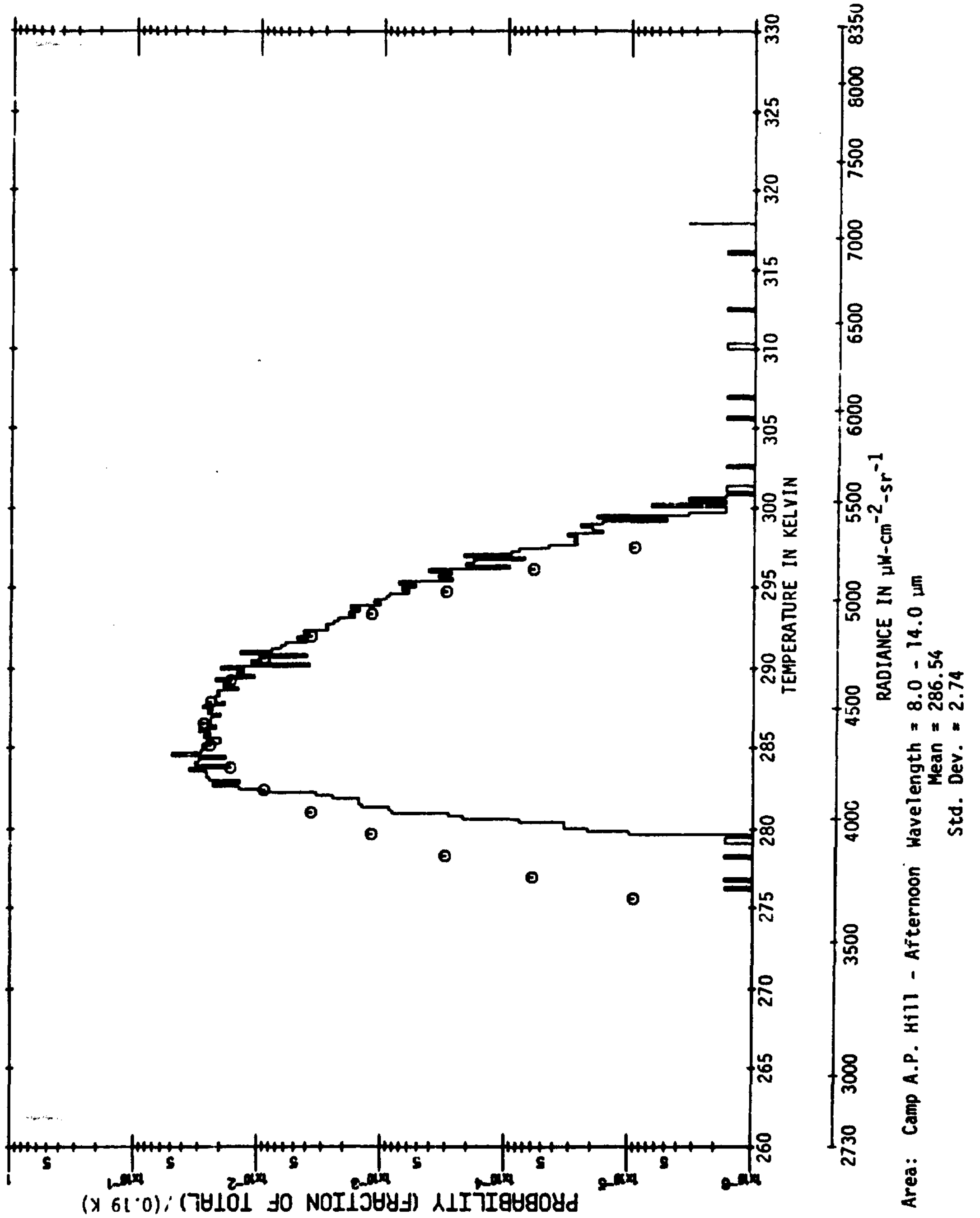
Area: Camp A.P. Hill - Morning Wavelength = 8.0 - 14.0 µm
Mean = 283.44
Std. Dev. = 2.31

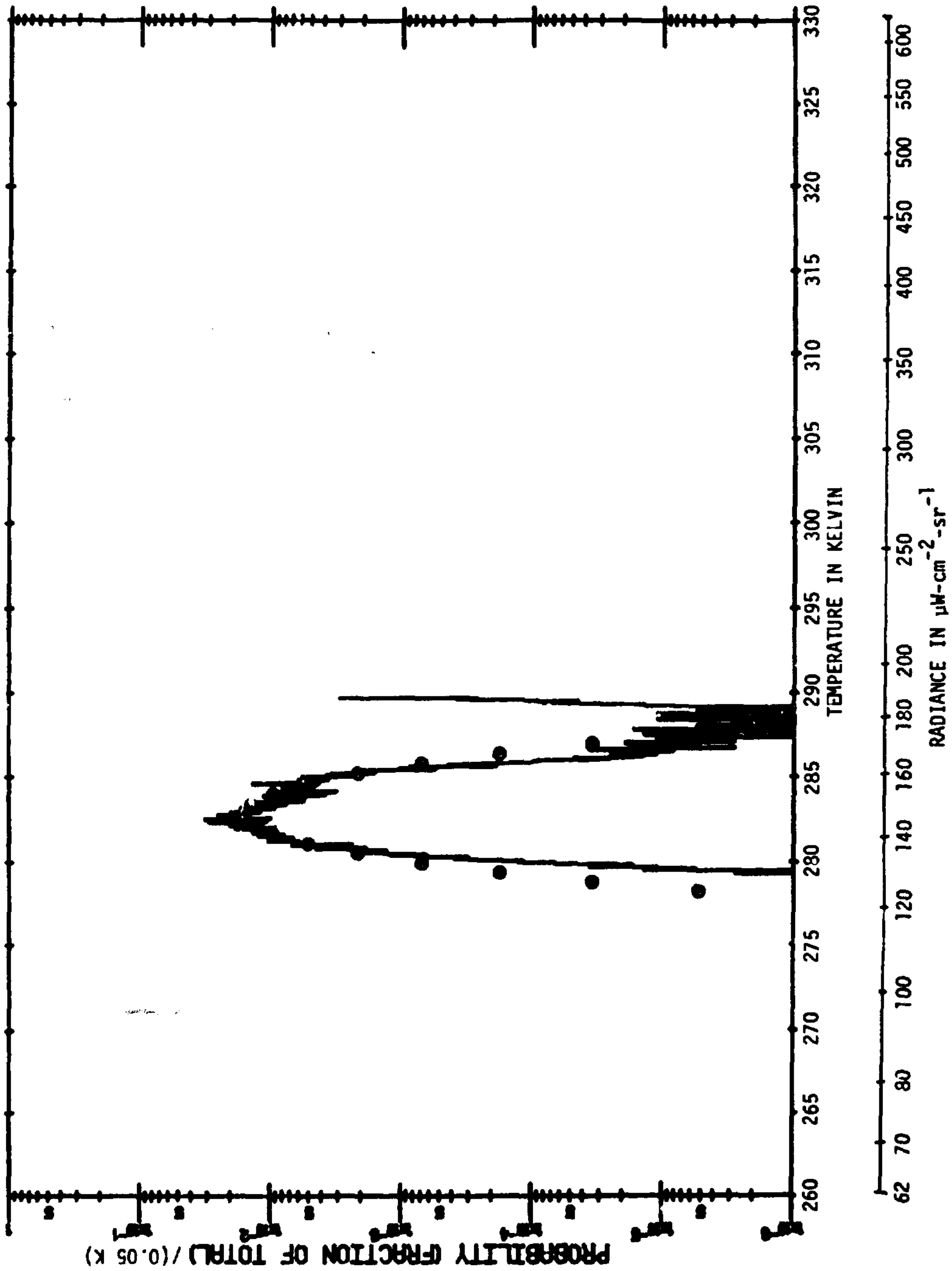


Area: Camp A.P. Hill - Afternoon Wavelength = 2.0 - 2.6 µm
Mean = 62.36
Std. Dev. = 23.79

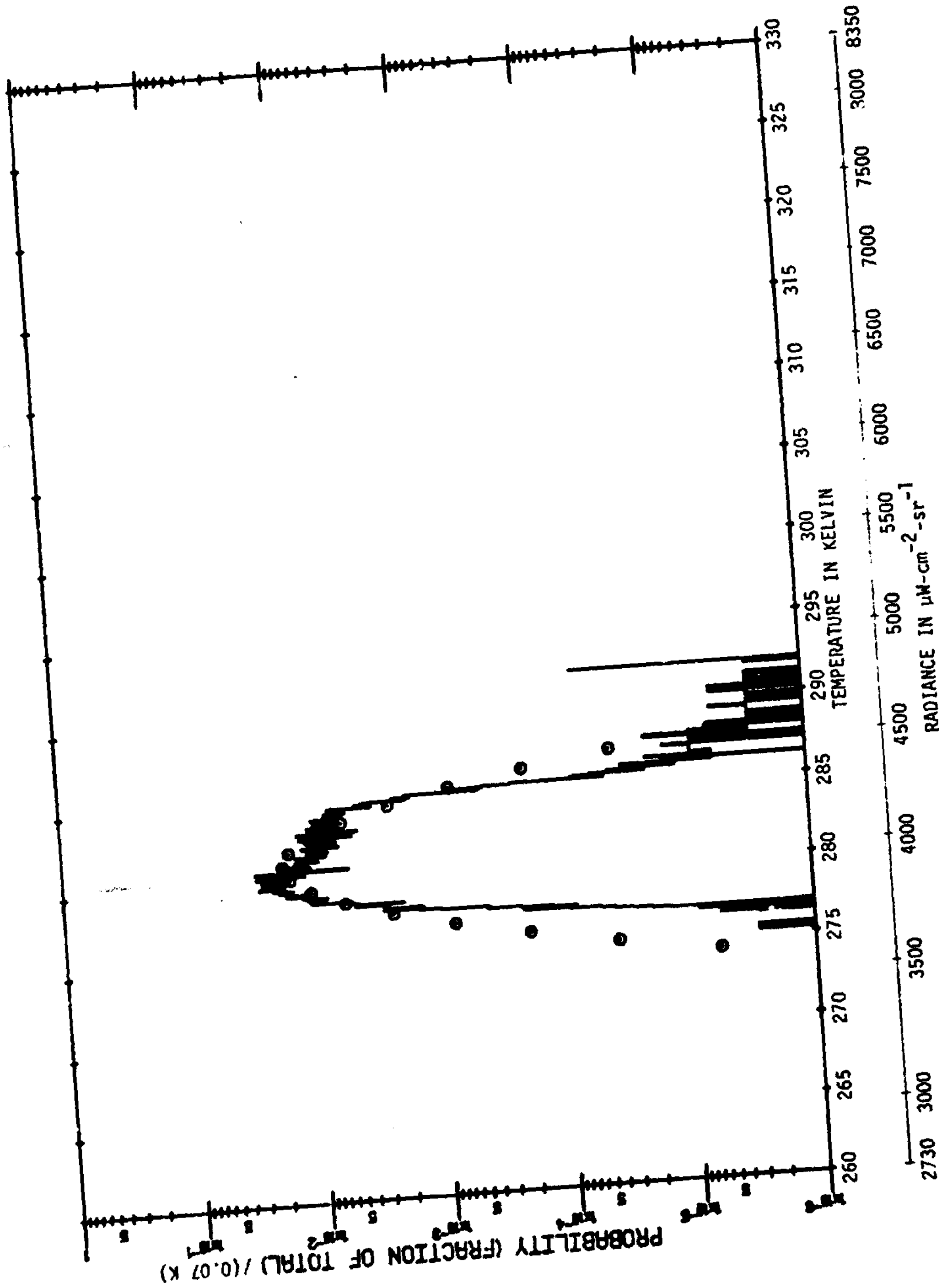


Area: Camp A.P. Hill - Afternoon Wavelength = 4.5 - 5.5 µm
Mean = 285.69
Std. Dev. = 2.29

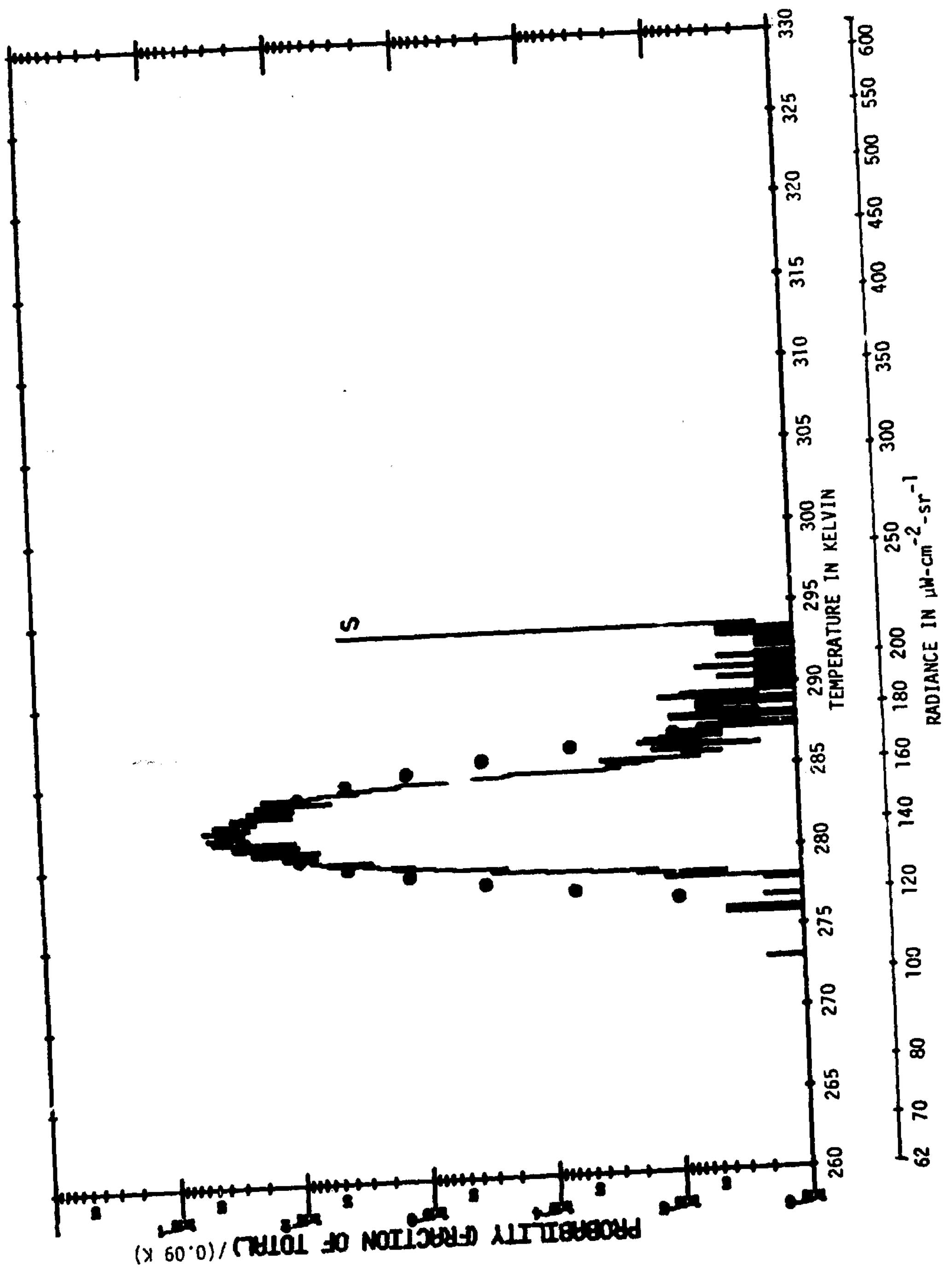

PROBABILITY (FRACTION OF TOTAL)/(0.19 K)
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
2730 3000 3500 4000 4500 5000 5500 6000 6500 7000 7500 8000 8350
Area: Camp A.P. Hill - Afternoon
Wavelength = 8.0 - 14.0 μm
Mean = 286.54
Std. Dev. = 2.74



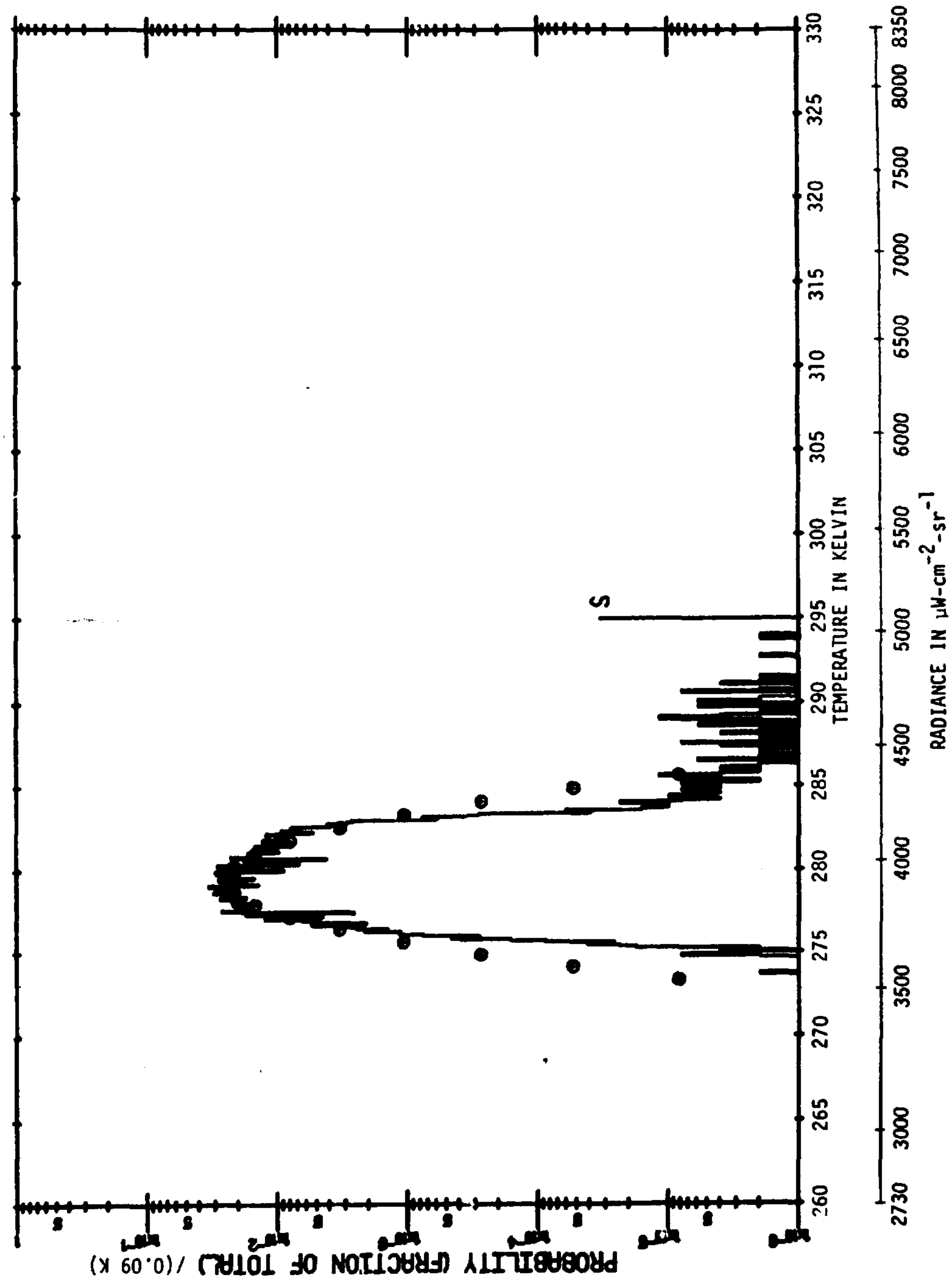
Area: Camp A.P. Hill - Evening Wavelength = 4.5 - 5.5 µm
Mean = 282.89
Std. Dev. = 1.17



Area: Camp A.P. Hill - Evening Wavelength = 8.0 - 14.0 μm
Mean = 281.16
Std. Dev. = 1.70



Area: Camp A.P. Hill - Midnight Wavelength = 4.5 - 5.5 μm
Mean = 282.00
Std. Dev. = 1.26



Area: Camp A.P. Hill - Midnight Wavelength = 8.0 - 14.0 μm
Mean = 279.50
Std. Dev. = 1.54

CAMP A.P. HILL, VIRGINIA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: Channel 2: 2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 4: 4.5 - 5.5 μm (°K)

Channel 5: 8.0 - 14.0 μm (°K)

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*Because of the relatively small temperature changes in the scenery, there is a nearly linear relationship between the temperature and radiance statistics for the thermal channels. It is pertinent, therefore, to compute correlations between radiance and temperature channels.

STATISTICS OF THE MORNING SCENE

Number of Subregions = 1

Pixel Subarea Divisions at: 1 855

Line Subarea Divisions at: 1 700

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (2.0 - 2.6 μm)
4 (4.5 - 5.5 μm)
5 (8.0 - 14.0 μm)

Correlation	2	4	5
2	1.000		
4	0.841	1.000	
5	0.760	0.905	1.000

Channels	2	4	5
Mean	5.9364E+01	2.8377E+02	2.8344E+02
St. Dev.	2.7030E+01	2.5920E+00	2.3146E+00
Total Points	589260.	589260.	589260.

STATISTICS OF THE AFTERNOON SCENE

Number of Subregions = 1

Pixel Subarea Divisions at: 1 855

Line Subarea Divisions at: 1 704

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (2.0 - 2.6 μm)
4 (4.5 - 5.5 μm)
5 (8.0 - 14.0 μm)

Correlation	2	4	5
2	1.000		
4	0.782	1.000	
5	0.636	0.882	1.000

Channels	2	4	5
Mean	6.2356E+01	2.8569E+02	2.8654E+02
St. Dev.	2.4785E+01	2.2922E+00	2.7390E+00
Total Points	597800.	597800.	597800.

STATISTICS OF THE EVENING SCENE

Number of Subregions = 1

Pixel Subarea Divisions at: 344 855

Line Subarea Divisions at: 1 700

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 4 (4.5 - 5.5 μm)
5 (8.0 - 14.0 μm)

Correlation	4	5
4	1.000	
5	0.767	1.000

Channels	4	5
Mean	2.8289E+02	2.8116E+02
St. Dev.	1.1683E+00	1.7043E+00
Total Pts.	357700.	357700.

STATISTICS OF THE MIDNIGHT SCENE

Number of Subregions = 1

Pixel Subarea Divisions at. 384 895

Line Subarea Divisions at: 1 1000

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 4 (4.5 - 5.5 μm)
5 (8.0 - 14.0 μm)

Correlation	4	5
4	1.000	
5	0.669	1.000

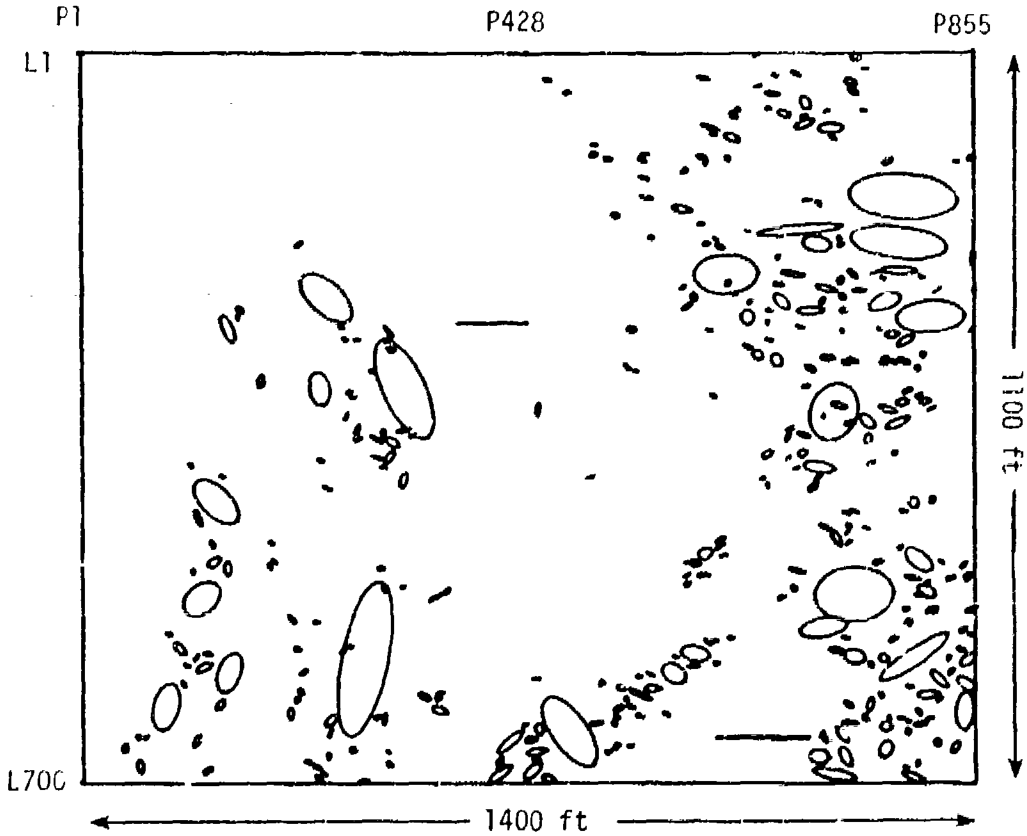
Channels	4	5
Mean	2.8200E+02	2.7950E+02
St. Dev.	1.2626E+00	1.5362E+00
Total Pts.	504357.	504357.

CAMP A.P. HILL, VIRGINIA

Ellipse Statistics*

Spectral Bands: 2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 14.0 μm

*Target locations (approximately 10) are designated by X's in some of the pictures. Not all targets are necessarily observed. The stress in this backgrounds handbook is not on targets, which are considered incidental in this work. Most of the persistent features in the long wavelength regions, however, are targets.



Area: Camp A.P. Hill (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 1.50 σ

Mean = 59.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 27.03 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 2.0 - 2.6 μm

Mean = 59.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 27.03 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	485
5.0	TO	10.0	75
10.0	TO	15.0	24
15.0	TO	20.0	19
20.0	TO	25.0	14
25.0	TO	30.0	2
30.0	TO	35.0	9
35.0	TO	40.0	3
40.0	TO	45.0	5
45.0	TO	50.0	3
50.0	TO	75.0	4
75.0	TO	100.0	4
100.0	TO	150.0	3
150.0	TO	200.0	2
200.0	TO	250.0	3
250.0	TO	300.0	1
300.0	TO	400.0	2
400.0	TO	500.0	3
	OVER	500.0	5

TOTAL NUMBER OF ELLIPTICAL AREAS = 666

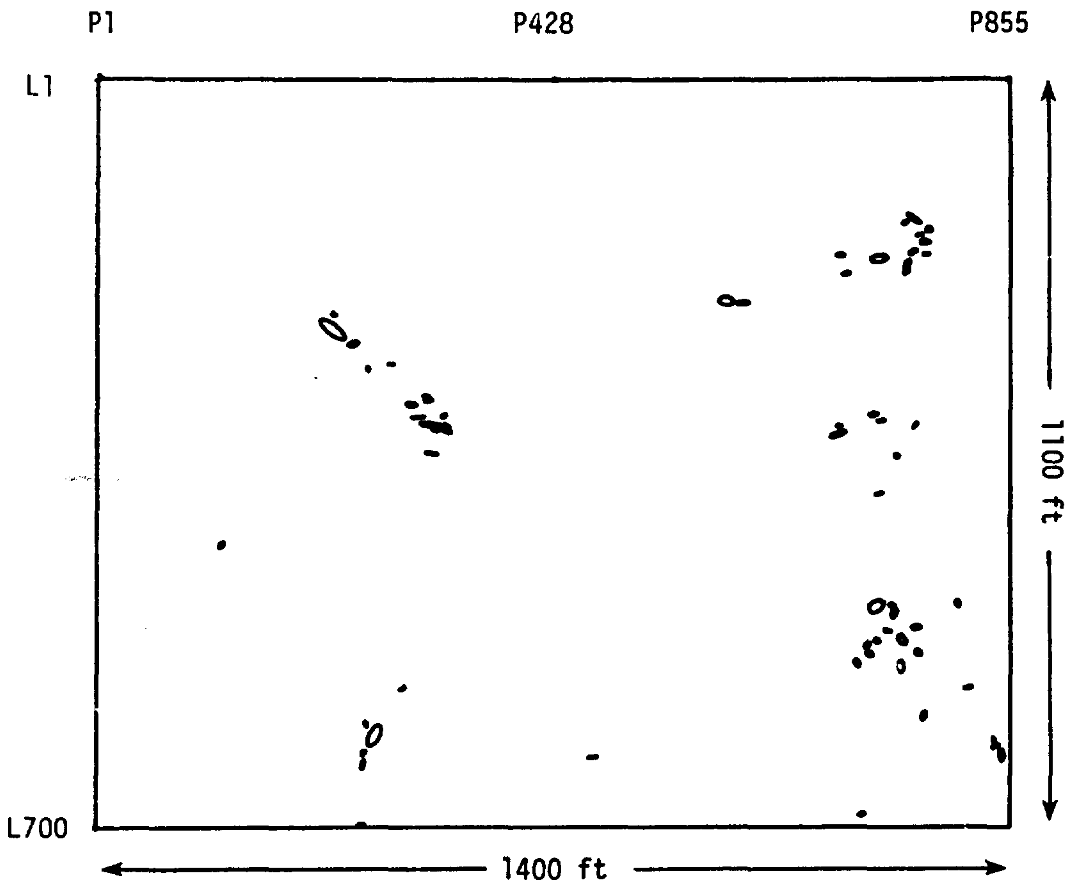
925 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	302
7	TO	10	22	TO	32	96
10	TO	12	32	TO	39	42
12	TO	14	39	TO	45	31
14	TO	16	45	TO	52	22
16	TO	17	52	TO	55	6
17	TO	20	55	TO	65	24
20	TO	22	65	TO	72	13
22	TO	24	72	TO	78	15
24	TO	26	78	TO	85	7
26	TO	28	85	TO	91	7
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	10
32	TO	39	104	TO	127	9
39	TO	45	127	TO	147	11
45	TO	55	147	TO	180	12
55	TO	71	180	TO	232	14
71	TO	100	232	TO	328	8
OVER		100	OVER		328	25

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	19
1.2	TO	1.3	17
1.3	TO	1.4	108
1.4	TO	1.5	54
1.5	TO	1.6	69
1.6	TO	1.7	93
1.7	TO	1.8	48
1.8	TO	1.9	39
1.9	TO	2.0	30
2.0	TO	2.4	79
2.4	TO	2.6	30
2.6	TO	2.8	15
2.8	TO	3.0	16
3.0	TO	3.5	16
3.5	TO	4.0	13
4.0	TO	4.5	3
	OVER	4.5	17



Area: Camp A.P. Hill (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 2.50 σ

Mean = 59.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 27.03 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 2.0 - 2.6 μm

Mean = 59.36 μW-cm^{-2}-sr^{-1}-μm^{-1}

σ = 27.03 μW-cm^{-2}-sr^{-1}-μm^{-1}

BY AREA

SQUARE METERS		FREQUENCY
0.6 TO	5.0	117
5.0 TO	10.0	11
10.0 TO	15.0	4
15.0 TO	20.0	2
20.0 TO	25.0	0
25.0 TO	30.0	1
30.0 TO	35.0	0
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	1
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 137

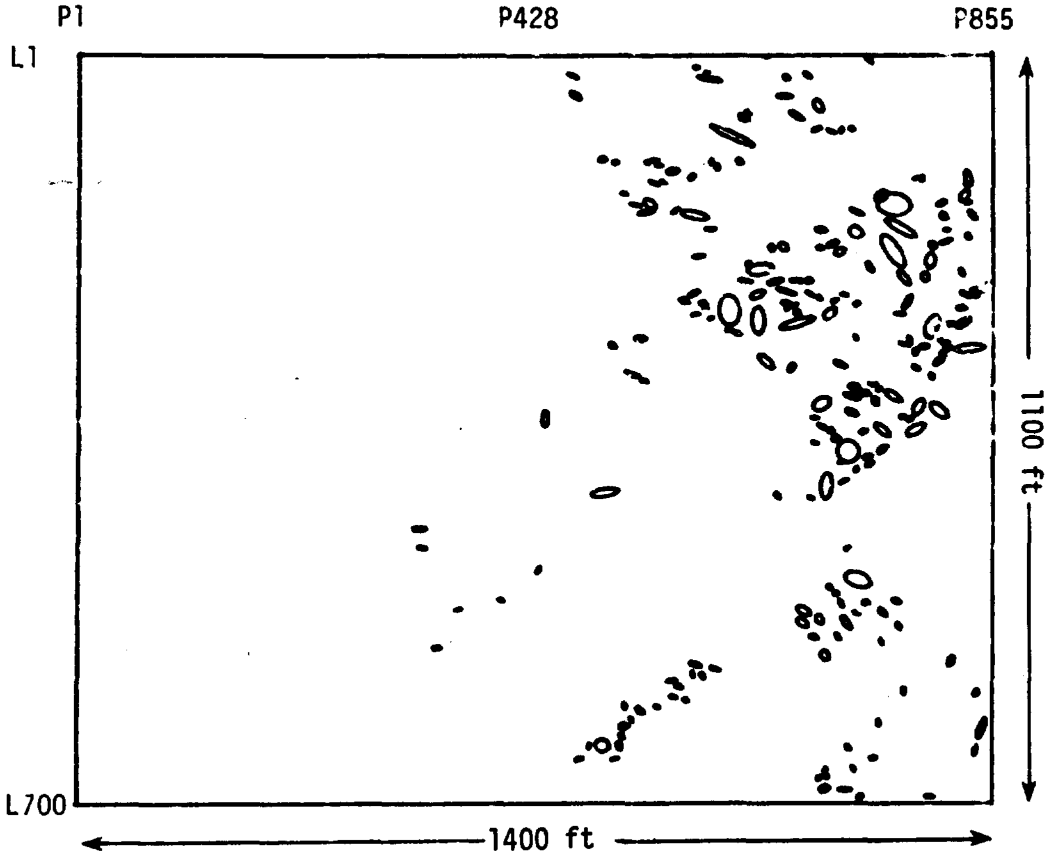
211 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	74
7 TO	10	22 TO	32	23
10 TO	12	32 TO	39	7
12 TO	14	39 TO	45	8
14 TO	16	45 TO	52	5
16 TO	17	52 TO	55	2
17 TO	20	55 TO	65	1
20 TO	22	65 TO	72	3
22 TO	24	72 TO	78	3
24 TO	26	78 TO	85	2
26 TO	28	85 TO	91	1
28 TO	30	91 TO	98	1
30 TO	32	98 TO	104	1
32 TO	39	104 TO	127	2
39 TO	45	127 TO	147	1
45 TO	55	147 TO	180	1
55 TO	71	180 TO	232	1
71 TO	100	232 TO	328	0
OVER	100	OVER	328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	3
1.3 TO 1.4	32
1.4 TO 1.5	8
1.5 TO 1.6	18
1.6 TO 1.7	22
1.7 TO 1.8	13
1.8 TO 1.9	7
1.9 TO 2.0	6
2.0 TO 2.4	15
2.4 TO 2.6	4
2.6 TO 2.8	4
2.8 TO 3.0	3
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	1
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 283.77 Kelvin

Std. Dev. = σ = 2.59 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING
DISTRIBUTIONS OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 283.77 Kelvin

σ = 2.59 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	267
5.0	TO	10.0	50
10.0	TO	15.0	18
15.0	TO	20.0	10
20.0	TO	25.0	7
25.0	TO	30.0	3
30.0	TO	35.0	2
35.0	TO	40.0	3
40.0	TO	45.0	2
45.0	TO	50.0	3
50.0	TO	75.0	3
75.0	TO	100.0	2
100.0	TO	150.0	2
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 372

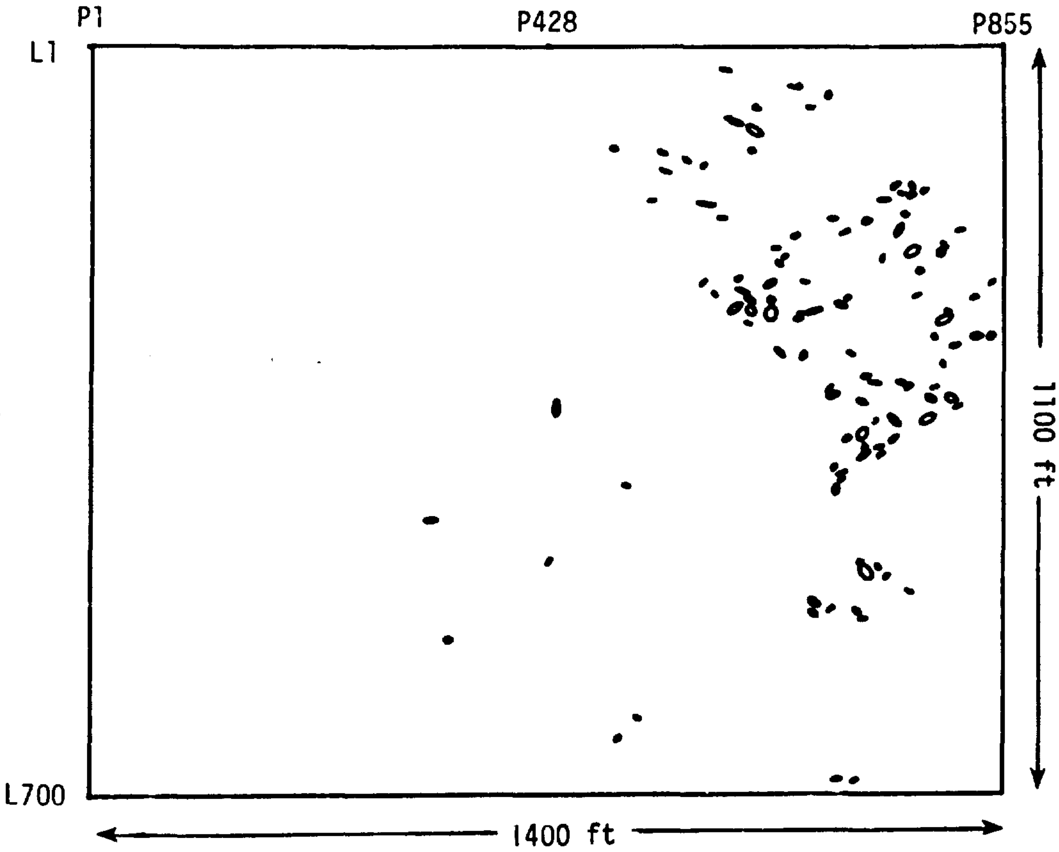
205 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	165
7	TO	10	22	TO	32	50
10	TO	12	32	TO	39	28
12	TO	14	39	TO	45	27
14	TO	16	45	TO	52	9
16	TO	17	52	TO	55	6
17	TO	20	55	TO	65	23
20	TO	22	65	TO	72	6
22	TO	24	72	TO	78	5
24	TO	26	78	TO	85	8
26	TO	28	85	TO	91	6
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	2
32	TO	39	104	TO	127	8
39	TO	45	127	TO	147	9
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	4
71	TO	100	232	TO	328	6
OVER		100	OVER		328	6

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	17
1.2	TO	1.3	17
1.3	TO	1.4	80
1.4	TO	1.5	49
1.5	TO	1.6	27
1.6	TO	1.7	39
1.7	TO	1.8	31
1.8	TO	1.9	24
1.9	TO	2.0	19
2.0	TO	2.4	36
2.4	TO	2.6	9
2.6	TO	2.8	5
2.8	TO	3.0	5
3.0	TO	3.5	8
3.5	TO	4.0	3
4.0	TO	4.5	2
OVER		4.5	1



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 283.77 Kelvin

Std. Dev. = σ = 2.59 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 283.77 Kelvin
σ = 2.59 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.6 TO 5.0	174
5.0 TO 10.0	22
10.0 TO 15.0	8
15.0 TO 20.0	3
20.0 TO 25.0	2
25.0 TO 30.0	2
30.0 TO 35.0	0
35.0 TO 40.0	0
40.0 TO 45.0	0
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 211

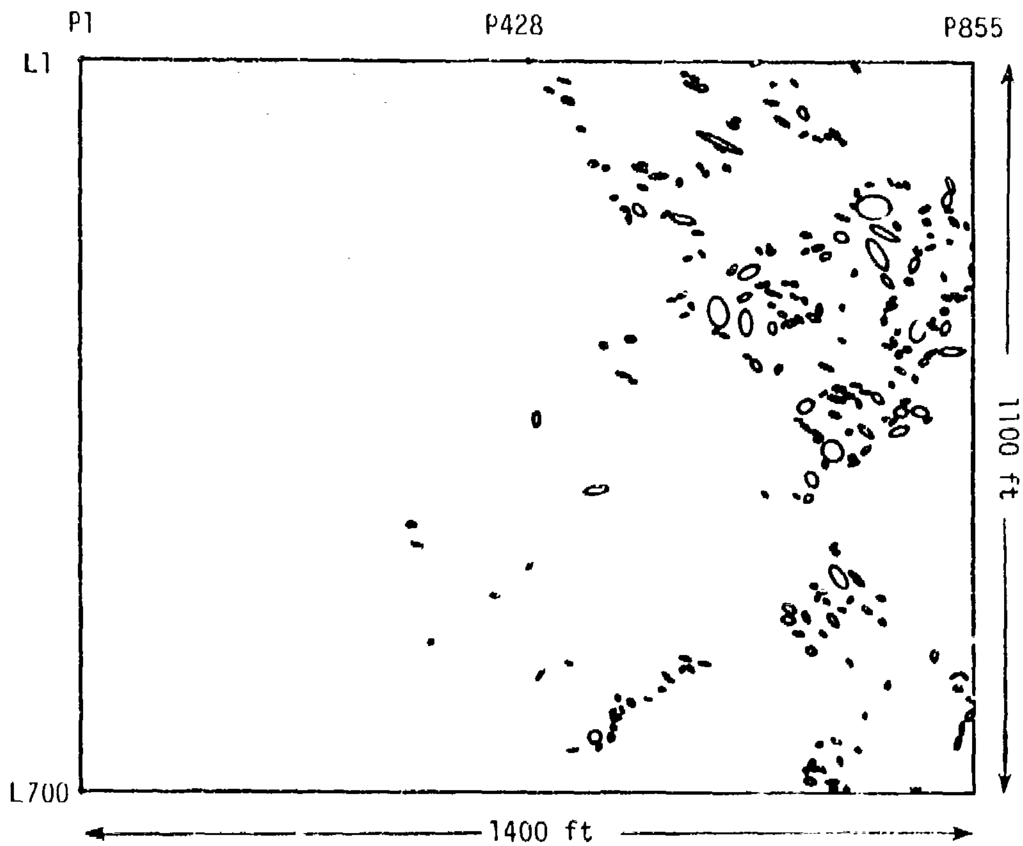
131 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	101
7 TO 10	22 TO 32	44
10 TO 12	32 TO 39	14
12 TO 14	39 TO 45	8
14 TO 16	45 TO 52	11
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	10
20 TO 22	65 TO 72	6
22 TO 24	72 TO 78	4
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	3
30 TO 32	98 TO 104	2
32 TO 39	104 TO 127	3
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	9
1.2 TO 1.3	8
1.3 TO 1.4	42
1.4 TO 1.5	28
1.5 TO 1.6	24
1.6 TO 1.7	29
1.7 TO 1.8	18
1.8 TO 1.9	17
1.9 TO 2.0	11
2.0 TO 2.4	21
2.4 TO 2.6	3
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 283.44 Kelvin

Std. Dev. = σ = 2.31 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 8.0 - 14.0 μm

Mean = 283.44 Kelvin

σ = 2.31 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.6 TO 5.0	319
5.0 TO 10.0	59
10.0 TO 15.0	15
15.0 TO 20.0	14
20.0 TO 25.0	5
25.0 TO 30.0	3
30.0 TO 35.0	4
35.0 TO 40.0	0
40.0 TO 45.0	2
45.0 TO 50.0	1
50.0 TO 75.0	4
75.0 TO 100.0	2
100.0 TO 150.0	1
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 429

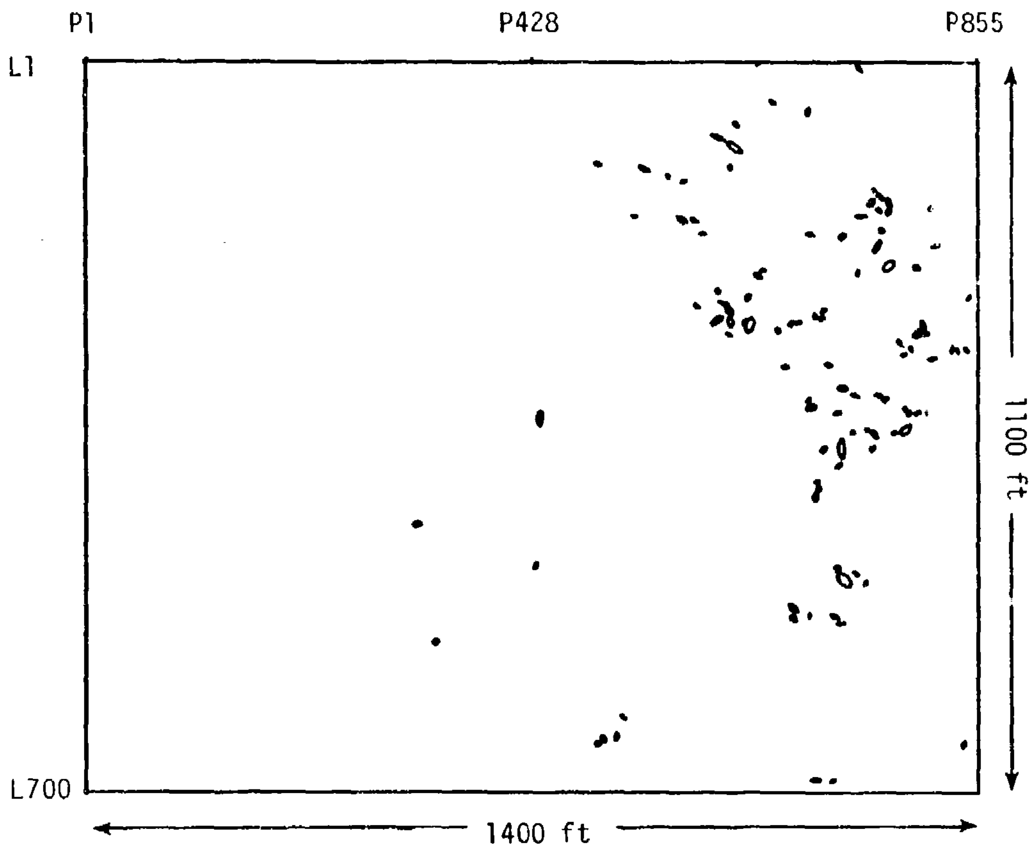
311 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	198
7 TO 10	22 TO 32	56
10 TO 12	32 TO 39	29
12 TO 14	39 TO 45	30
14 TO 16	45 TO 52	18
16 TO 17	52 TO 55	5
17 TO 20	55 TO 65	15
20 TO 22	65 TO 72	15
22 TO 24	72 TO 78	7
24 TO 26	78 TO 85	6
26 TO 28	85 TO 91	5
28 TO 30	91 TO 98	6
30 TO 32	98 TO 104	4
32 TO 39	104 TO 127	10
39 TO 45	127 TO 147	5
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	6
71 TO 100	232 TO 328	8
OVER 100	OVER 328	4

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	18
1.2 TO 1.3	35
1.3 TO 1.4	76
1.4 TO 1.5	54
1.5 TO 1.6	29
1.6 TO 1.7	47
1.7 TO 1.8	27
1.8 TO 1.9	23
1.9 TO 2.0	20
2.0 TO 2.4	55
2.4 TO 2.6	15
2.6 TO 2.8	8
2.8 TO 3.0	6
3.0 TO 3.5	4
3.5 TO 4.0	6
4.0 TO 4.5	5
OVER 4.5	1



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 283.44 Kelvin

Std. Dev. = σ = 2.31 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MORNING

MORNING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 8.0 - 14.0 μm

Mean = 283.44 Kelvin

σ = 2.31 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	214
5.0	TO	10.0	15
10.0	TO	15.0	4
15.0	TO	20.0	4
20.0	TO	25.0	0
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 238

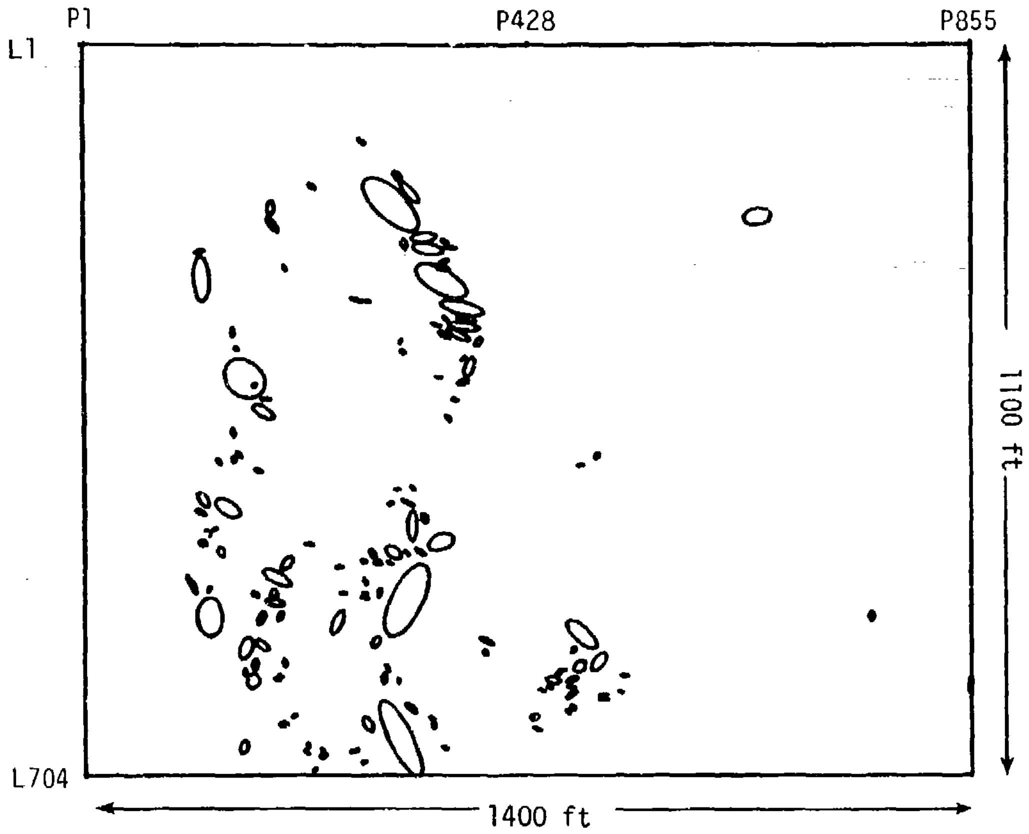
229 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	141
7	TO	10	22	TO	32	43
10	TO	12	32	TO	39	12
12	TO	14	39	TO	45	11
14	TO	16	45	TO	52	5
16	TO	17	52	TO	55	4
17	TO	20	55	TO	65	6
20	TO	22	65	TO	72	4
22	TO	24	72	TO	78	1
24	TO	26	78	TO	85	3
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	2
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	2
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	10
1.2	TO	1.3	26
1.3	TO	1.4	58
1.4	TO	1.5	36
1.5	TO	1.6	20
1.6	TO	1.7	31
1.7	TO	1.8	15
1.8	TO	1.9	8
1.9	TO	2.0	9
2.0	TO	2.4	15
2.4	TO	2.6	6
2.6	TO	2.8	1
2.8	TO	3.0	2
3.0	TO	3.5	1
3.5	TO	4.0	0
4.0	TO	4.5	0
OVER		4.5	0



Area: Camp A.P. Hill (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 2.00 σ

Mean = 62.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 24.79 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

AFTERNOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 2.0 - 2.6 μm

Mean = 62.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 24.79 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	237
5.0	TO	10.0	25
10.0	TO	15.0	9
15.0	TO	20.0	7
20.0	TO	25.0	4
25.0	TO	30.0	2
30.0	TO	35.0	2
35.0	TO	40.0	4
40.0	TO	45.0	2
45.0	TO	50.0	1
50.0	TO	75.0	5
75.0	TO	100.0	2
100.0	TO	150.0	2
150.0	TO	200.0	1
200.0	TO	250.0	1
250.0	TO	300.0	1
300.0	TO	400.0	2
400.0	TO	500.0	1
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 308

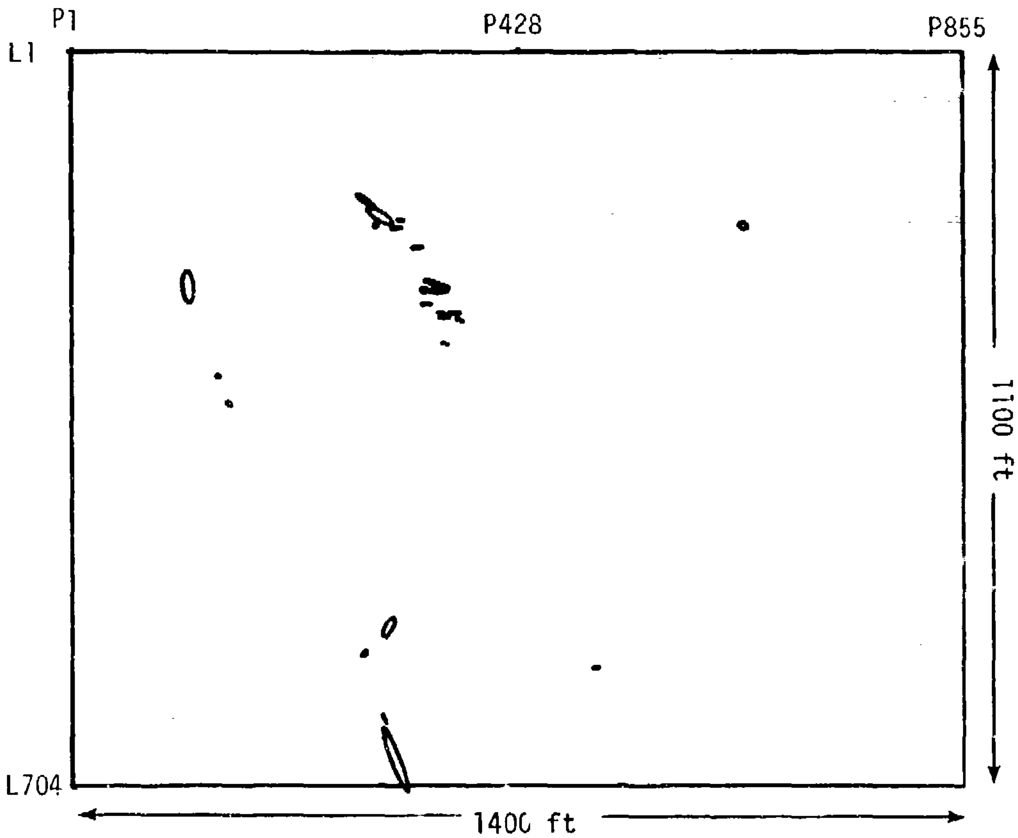
541 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	158
7	TO	10	22	TO	32	42
10	TO	12	32	TO	39	20
12	TO	14	39	TO	45	10
14	TO	16	45	TO	52	10
16	TO	17	52	TO	55	2
17	TO	20	55	TO	65	6
20	TO	22	65	TO	72	6
22	TO	24	72	TO	78	2
24	TO	26	78	TO	85	5
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	4
30	TO	32	98	TO	104	2
32	TO	39	104	TO	127	5
39	TO	45	127	TO	147	3
45	TO	55	147	TO	180	7
55	TO	71	180	TO	232	5
71	TO	100	232	TO	328	6
	OVER	100		OVER	328	14

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	1
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	8
1.3	TO	1.4	61
1.4	TO	1.5	35
1.5	TO	1.6	20
1.6	TO	1.7	40
1.7	TO	1.8	29
1.8	TO	1.9	12
1.9	TO	2.0	16
2.0	TO	2.4	34
2.4	TO	2.6	7
2.6	TO	2.8	8
2.8	TO	3.0	8
3.0	TO	3.5	9
3.5	TO	4.0	3
4.0	TO	4.5	5
	OVER	4.5	10



Area: Camp A.P. Hill (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 3.00 σ

Mean = 62.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 24.79 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

AFTERNOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 2.0 - 2.6 μm

Mean = 62.36 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 24.79 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
0.6 TO 5.0	33
5.0 TO 10.0	3
10.0 TO 15.0	1
15.0 TO 20.0	2
20.0 TO 25.0	0
25.0 TO 30.0	1
30.0 TO 35.0	0
35.0 TO 40.0	0
40.0 TO 45.0	0
45.0 TO 50.0	1
50.0 TO 75.0	1
75.0 TO 100.0	0
100.0 TO 150.0	1
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 43

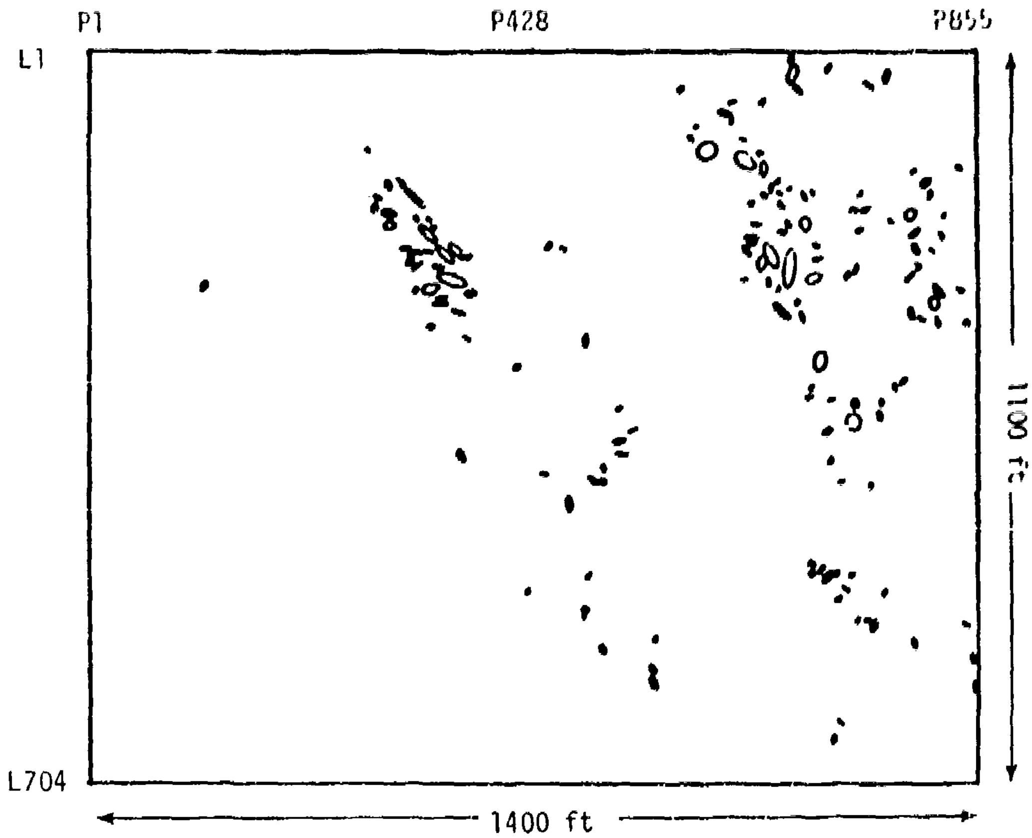
83 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	22
7 TO 10	22 TO 32	5
10 TO 12	32 TO 39	3
12 TO 14	39 TO 45	2
14 TO 16	45 TO 52	2
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	1
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	1
71 TO 100	232 TO 328	3
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	9
1.4 TO 1.5	6
1.5 TO 1.6	2
1.6 TO 1.7	8
1.7 TO 1.8	3
1.8 TO 1.9	1
1.9 TO 2.0	3
2.0 TO 2.4	5
2.4 TO 2.6	0
2.6 TO 2.8	3
2.8 TO 3.0	1
3.0 TO 3.5	1
3.5 TO 4.0	1
4.0 TO 4.5	0
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 285.69 Kelvin

Std. Dev. = σ = 2.29 Kelvin

EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

AFTERNOON
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ
Wavelength = 4.5 - 5.5 μm
Mean = 285.69 Kelvin
σ = 2.29 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	222
5.0	TO	10.0	33
10.0	TO	15.0	11
15.0	TO	20.0	4
20.0	TO	25.0	5
25.0	TO	30.0	5
30.0	TO	35.0	0
35.0	TO	40.0	1
40.0	TO	45.0	1
45.0	TO	50.0	1
50.0	TO	75.0	3
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 287

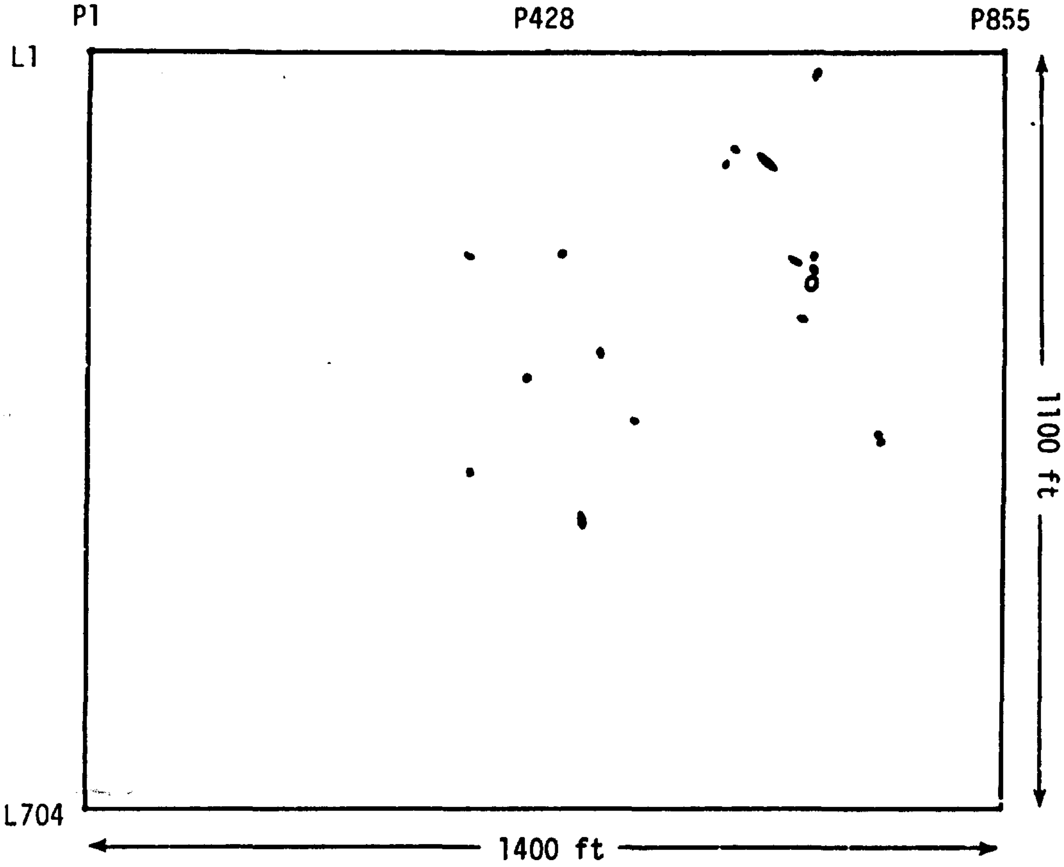
199 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	136
7	TO	10	22	TO	32	44
10	TO	12	32	TO	39	30
12	TO	14	39	TO	45	9
14	TO	16	45	TO	52	14
16	TO	17	52	TO	55	4
17	TO	20	55	TO	65	13
20	TO	22	65	TO	72	4
22	TO	24	72	TO	78	4
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	6
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	3
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	4
45	TO	55	147	TO	180	3
55	TO	71	180	TO	232	3
71	TO	100	232	TO	328	3
OVER		100	OVER		328	2

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	21
1.2	TO	1.3	22
1.3	TO	1.4	57
1.4	TO	1.5	38
1.5	TO	1.6	27
1.6	TO	1.7	27
1.7	TO	1.8	22
1.8	TO	1.9	23
1.9	TO	2.0	12
2.0	TO	2.4	17
2.4	TO	2.6	11
2.6	TO	2.8	4
2.8	TO	3.0	1
3.0	TO	3.5	1
3.5	TO	4.0	3
4.0	TO	4.5	1
	OVER	4.5	0



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.50 σ

Mean = 285.69 Kelvin

Std. Dev. = σ = 2.29 Kelvin

EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

AFTERNOON
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.50 σ
Wavelength = 4.5 - 5.5 μm
Mean = 285.69 Kelvin
σ = 2.29 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.6 TO 5.0	35
5.0 TO 10.0	2
10.0 TO 15.0	0
15.0 TO 20.0	1
20.0 TO 25.0	1
25.0 TO 30.0	0
30.0 TO 35.0	0
35.0 TO 40.0	0
40.0 TO 45.0	0
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 39

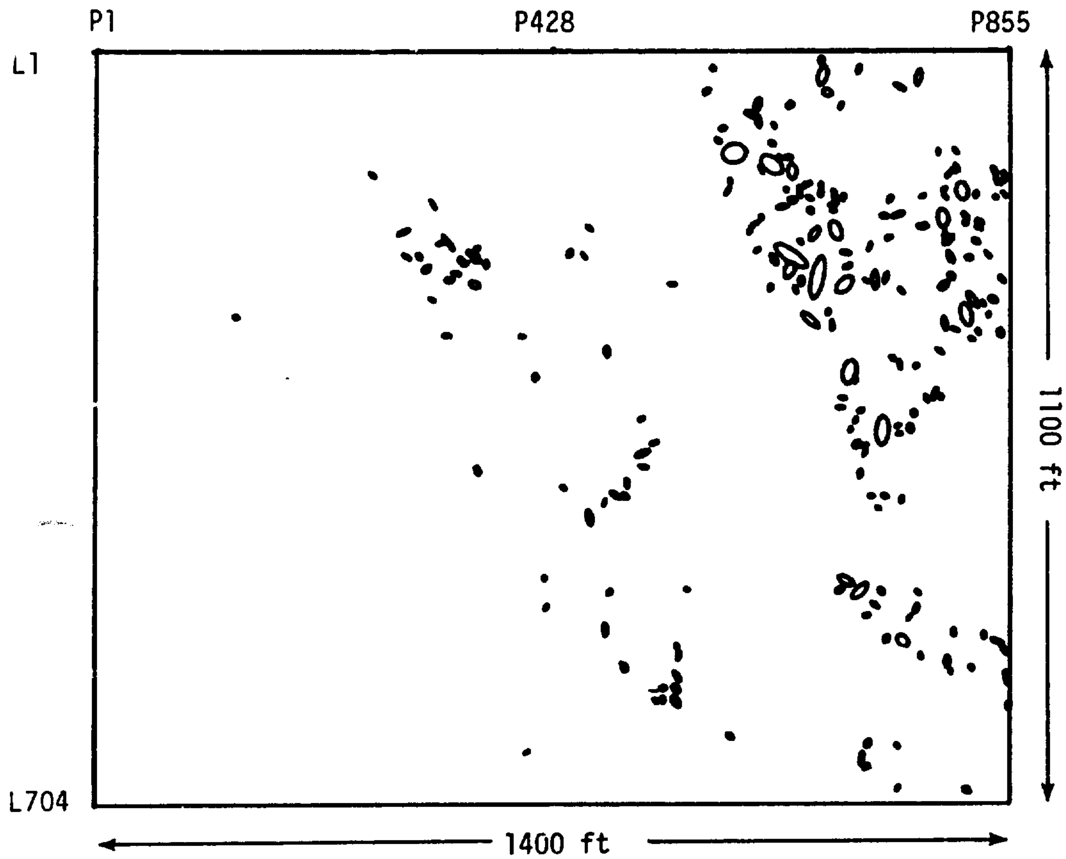
28 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	22
7 TO 10	22 TO 32	5
10 TO 12	32 TO 39	6
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	2
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	1
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	3
1.2 TO 1.3	6
1.3 TO 1.4	9
1.4 TO 1.5	5
1.5 TO 1.6	6
1.6 TO 1.7	2
1.7 TO 1.8	2
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	4
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 286.54 Kelvin
Std. Dev. = σ = 2.74 Kelvin
EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

AFTERNOON
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ
Wavelength = 8.0 - 14.0 μm
Mean = 286.54 Kelvin
σ = 2.74 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
0.6 TO	5.0	339
5.0 TO	10.0	50
10.0 TO	15.0	10
15.0 TO	20.0	5
20.0 TO	25.0	3
25.0 TO	30.0	3
30.0 TO	35.0	3
35.0 TO	40.0	2
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	5
75.0 TO	100.0	1
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 421

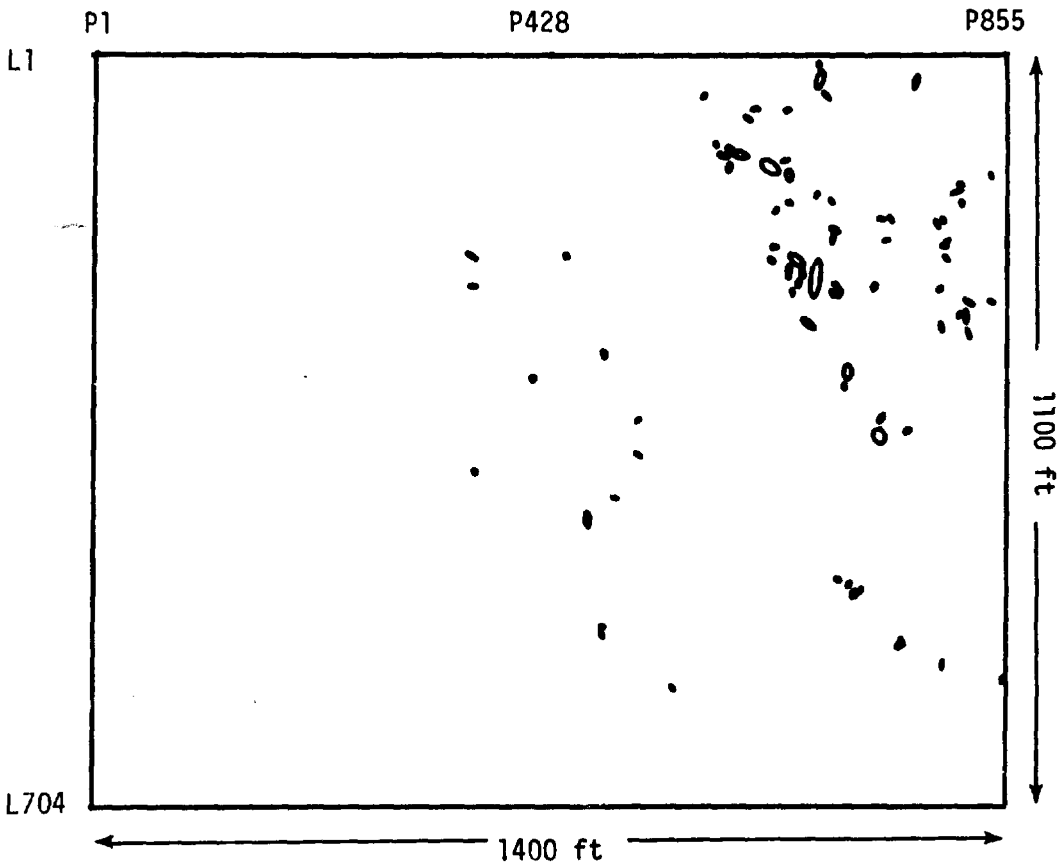
342 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	217
7 TO	10	22 TO	32	64
10 TO	12	32 TO	39	38
12 TO	14	39 TO	45	21
14 TO	16	45 TO	52	14
16 TO	17	52 TO	55	5
17 TO	20	55 TO	65	13
20 TO	22	65 TO	72	9
22 TO	24	72 TO	78	5
24 TO	26	78 TO	85	4
26 TO	28	85 TO	91	3
28 TO	30	91 TO	98	3
30 TO	32	98 TO	104	3
32 TO	39	104 TO	127	4
39 TO	45	127 TO	147	4
45 TO	55	147 TO	180	3
55 TO	71	180 TO	232	3
71 TO	100	232 TO	328	6
OVER	100	OVER	328	2

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	22
1.2 TO 1.3	39
1.3 TO 1.4	79
1.4 TO 1.5	69
1.5 TO 1.6	46
1.6 TO 1.7	46
1.7 TO 1.8	19
1.8 TO 1.9	18
1.9 TO 2.0	14
2.0 TO 2.4	41
2.4 TO 2.6	11
2.6 TO 2.8	4
2.8 TO 3.0	2
3.0 TO 3.5	8
3.5 TO 4.0	1
4.0 TO 4.5	2
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 286.54 Kelvin

Std. Dev. = σ = 2.74 Kelvin

EQUIVALENT ELLIPTICAL AREAS - AFTERNOON

ERIM

AFTERNOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.0 σ

Wavelength = 8.0 - 14.0 μm

Mean = 286.54 Kelvin

σ = 2.74 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	165
5.0	TO	10.0	9
10.0	TO	15.0	4
15.0	TO	20.0	2
20.0	TO	25.0	2
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	1
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	1
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 185

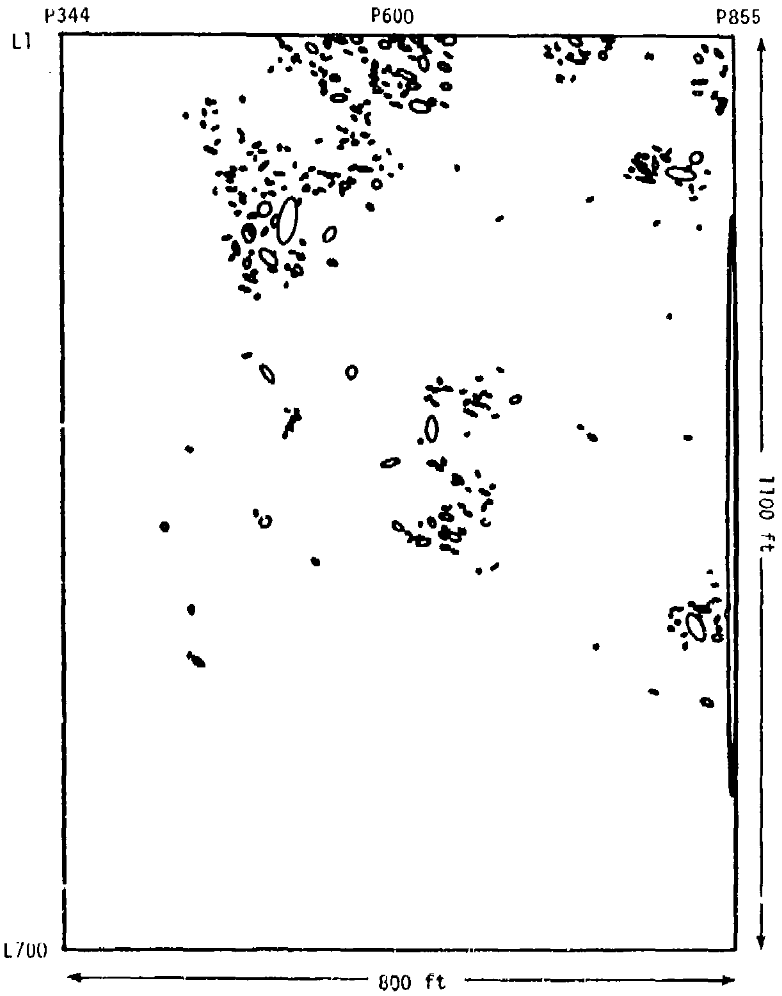
167 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	109
7	TO	10	22	TO	32	35
10	TO	12	32	TO	39	12
12	TO	14	39	TO	45	4
14	TO	16	45	TO	52	3
16	TO	17	52	TO	55	4
17	TO	20	55	TO	65	4
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	2
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	3
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	1
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	1
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	6
1.2	TO	1.3	14
1.3	TO	1.4	50
1.4	TO	1.5	37
1.5	TO	1.6	18
1.6	TO	1.7	15
1.7	TO	1.8	13
1.8	TO	1.9	6
1.9	TO	2.0	2
2.0	TO	2.4	16
2.4	TO	2.6	3
2.6	TO	2.8	0
2.8	TO	3.0	1
3.0	TO	3.5	4
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 282.89 Kelvin
Std. Dev. = σ = 1.17 Kelvin
EQUIVALENT ELLIPTICAL AREAS - EVENING

EVENING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 282.89 Kelvin

σ = 1.17 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
0.6 TO	5.0	311
5.0 TO	10.0	35
10.0 TO	15.0	10
15.0 TO	20.0	2
20.0 TO	25.0	3
25.0 TO	30.0	2
30.0 TO	35.0	0
35.0 TO	40.0	1
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	1
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 367

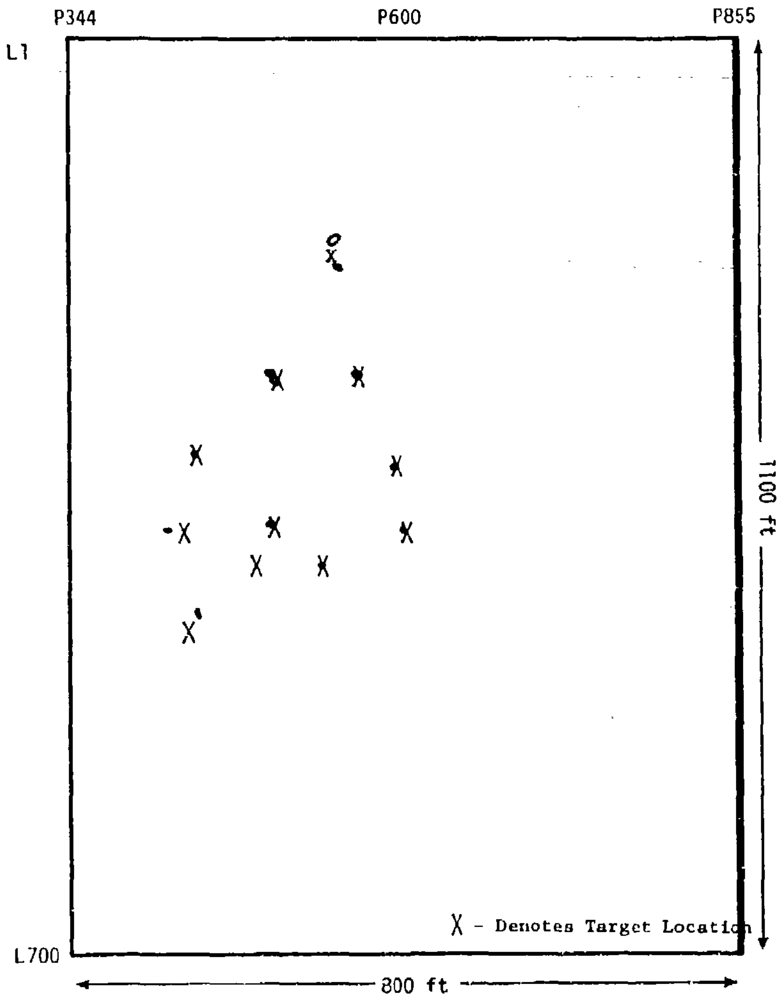
611 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	171
7 TO 10	22 TO 32	75
10 TO 12	32 TO 39	25
12 TO 14	39 TO 45	17
14 TO 16	45 TO 52	14
16 TO 17	52 TO 55	3
17 TO 20	55 TO 65	15
20 TO 22	65 TO 72	4
22 TO 24	72 TO 78	11
24 TO 26	78 TO 85	4
26 TO 28	85 TO 91	3
28 TO 30	91 TO 98	5
30 TO 32	98 TO 104	2
32 TO 39	104 TO 127	7
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	2
OVER 100	OVER 328	4

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	8
1.2 TO 1.3	11
1.3 TO 1.4	61
1.4 TO 1.5	20
1.5 TO 1.6	15
1.6 TO 1.7	52
1.7 TO 1.8	30
1.8 TO 1.9	19
1.9 TO 2.0	33
2.0 TO 2.4	61
2.4 TO 2.6	17
2.6 TO 2.8	10
2.8 TO 3.0	7
3.0 TO 3.5	12
3.5 TO 4.0	5
4.0 TO 4.5	1
OVER 4.5	5



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 282.89 Kelvin
Std. Dev. = σ = 1.17 Kelvin
EQUIVALENT ELLIPTICAL AREAS - EVENING

EVENING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

BY AREA

Threshold = Mean + 3.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 282.89 Kelvin
σ = 1.17 Kelvin

SQUARE METERS			FREQUENCY
0.6	TO	5.0	11
5.0	TO	10.0	2
10.0	TO	15.0	0
15.0	TO	20.0	0
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 14

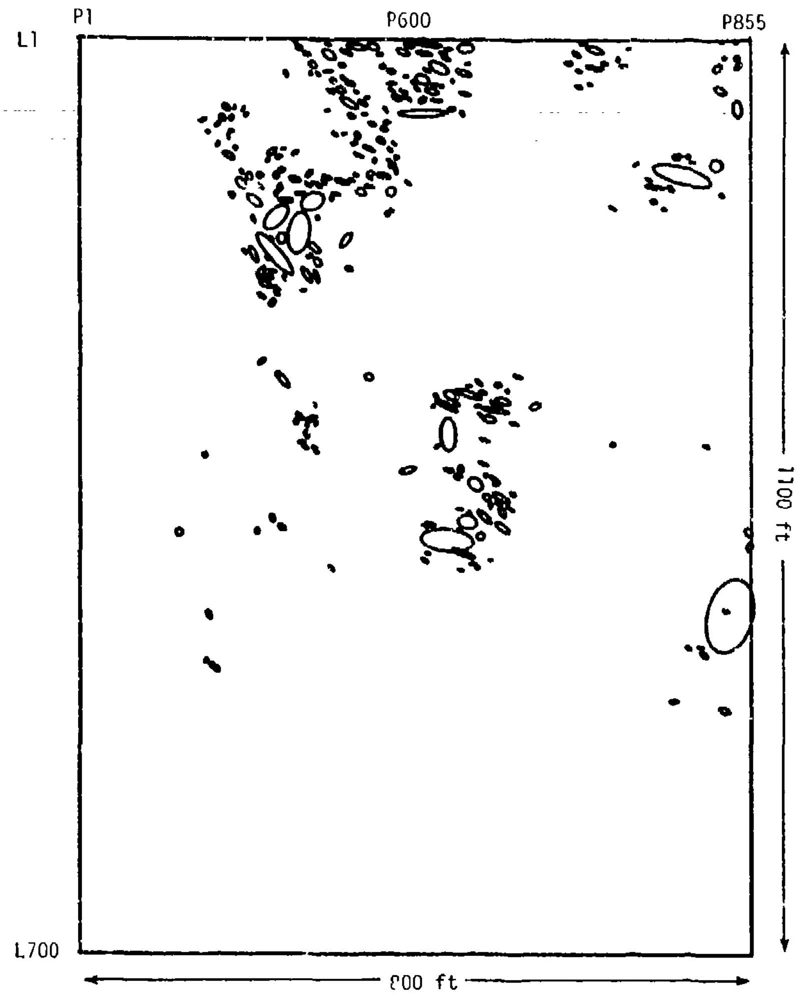
2 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	5
7	TO	10	22	TO	32	5
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	1
14	TO	16	45	TO	52	1
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	1
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	3
1.3	TO	1.4	3
1.4	TO	1.5	2
1.5	TO	1.6	2
1.6	TO	1.7	0
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	1
2.0	TO	2.4	0
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	1



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 281.16 Kelvin
Std. Dev. = σ = 1.70 Kelvin
EQUIVALENT ELLIPTICAL AREAS - EVENING

EVENING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 8.0 - 14.0 μm

Mean = 281.16 Kelvin

σ = 1.70 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	237
5.0	TO	10.0	39
10.0	TO	15.0	19
15.0	TO	20.0	4
20.0	TO	25.0	2
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	1
40.0	TO	45.0	1
45.0	TO	50.0	1
50.0	TO	75.0	2
75.0	TO	100.0	1
100.0	TO	150.0	2
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 311

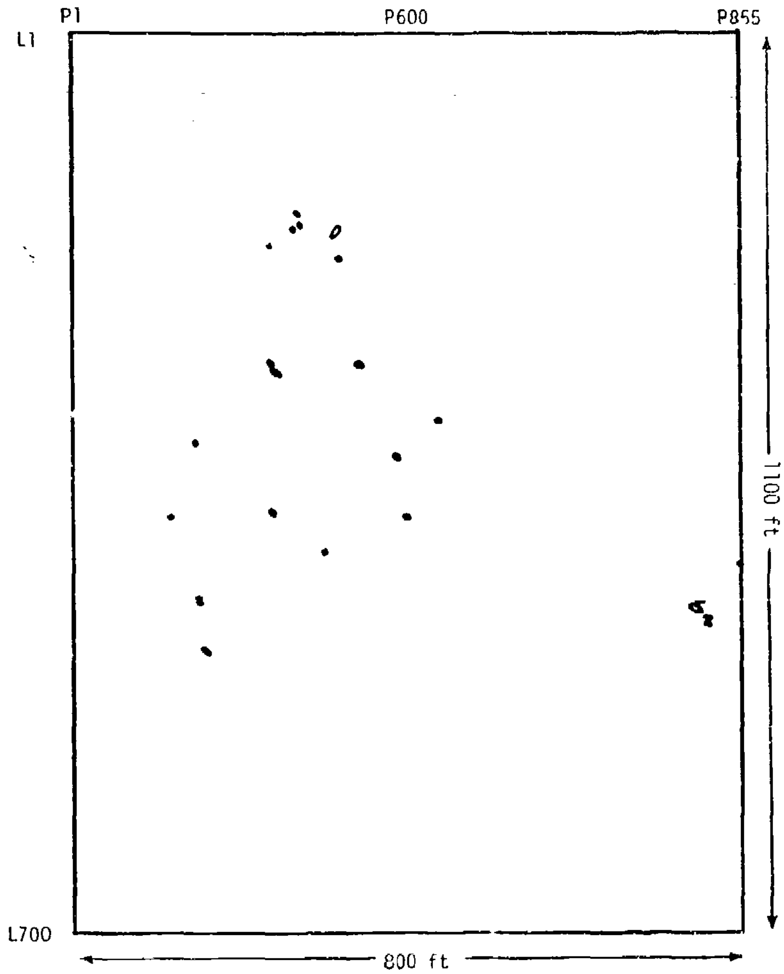
165 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	146
7	TO	10	22	TO	32	61
10	TO	12	32	TO	39	21
12	TO	14	39	TO	45	15
14	TO	16	45	TO	52	13
16	TO	17	52	TO	55	5
17	TO	20	55	TO	65	9
20	TO	22	65	TO	72	2
22	TO	24	72	TO	78	2
24	TO	26	78	TO	85	5
26	TO	28	85	TO	91	7
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	7
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	3
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	3
OVER		100	OVER		328	5

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	..0	0
1.0	TO	1.1	0
1.1	TO	1.2	16
1.2	TO	1.3	25
1.3	TO	1.4	74
1.4	TO	1.5	42
1.5	TO	1.6	27
1.6	TO	1.7	41
1.7	TO	1.8	20
1.8	TO	1.9	11
1.9	TO	2.0	7
2.0	TO	2.4	22
2.4	TO	2.6	5
2.6	TO	2.8	9
2.8	TO	3.0	4
3.0	TO	3.5	2
3.5	TO	4.0	1
4.0	TO	4.5	2
	OVER	4.5	3



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 281.16 Kelvin
Std. Dev. = σ = 1.70 Kelvin
EQUIVALENT ELLIPTICAL AREAS - EVENING

ERIM

EVENING

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 8.0 - 14.0 μm

Mean = 281.18 Kelvin

σ = 1.70 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
0.6 TO	5.0	23
5.0 TO	10.0	2
10.0 TO	15.0	0
15.0 TO	20.0	0
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 25

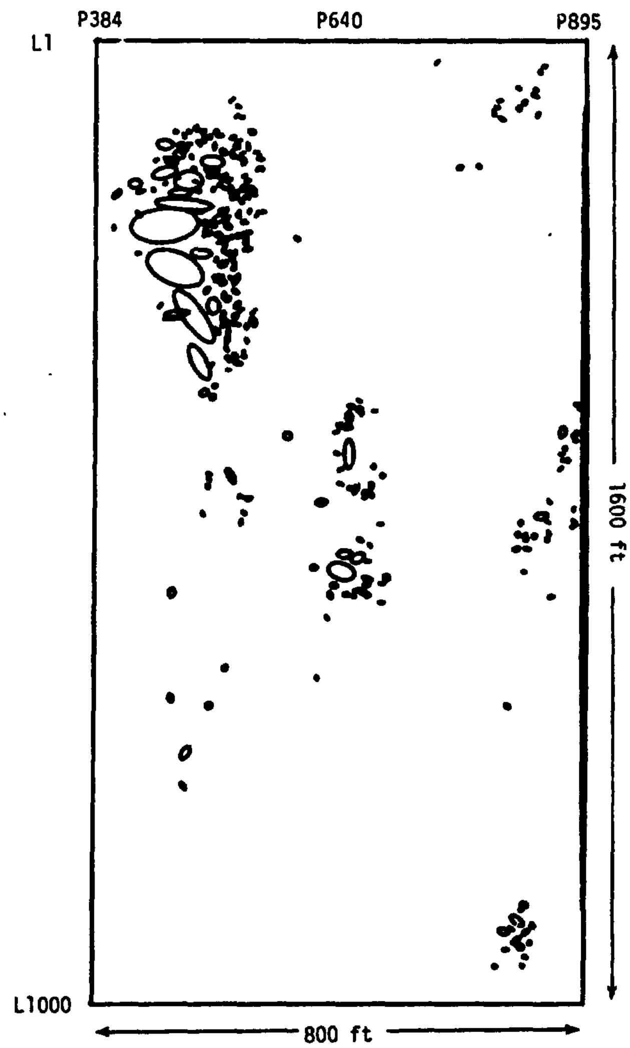
20 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	14
7 TO	10	22 TO	32	5
10 TO	12	32 TO	39	2
12 TO	14	39 TO	45	1
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	0
17 TO	20	55 TO	65	3
20 TO	22	65 TO	72	0
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	0
26 TO	28	85 TO	91	0
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	0
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	0
55 TO	71	180 TO	232	0
71 TO	100	232 TO	328	0
OVER	100	OVER	328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	4
1.2 TO 1.3	2
1.3 TO 1.4	6
1.4 TO 1.5	5
1.5 TO 1.6	2
1.6 TO 1.7	2
1.7 TO 1.8	2
1.8 TO 1.9	1
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	1
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 1.50 σ
Mean = 282.00 Kelvin
Std. Dev. = σ = 1.26 Kelvin
EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ
Wavelength = 4.5 - 5.5 μm
Mean = 282.00 Kelvin
σ = 1.26 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	422
5.0	TO	10.0	30
10.0	TO	15.0	9
15.0	TO	20.0	4
20.0	TO	25.0	5
25.0	TO	30.0	1
30.0	TO	35.0	3
35.0	TO	40.0	1
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	3
75.0	TO	100.0	1
100.0	TO	150.0	3
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	1
400.0	TO	500.0	1
	OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 486

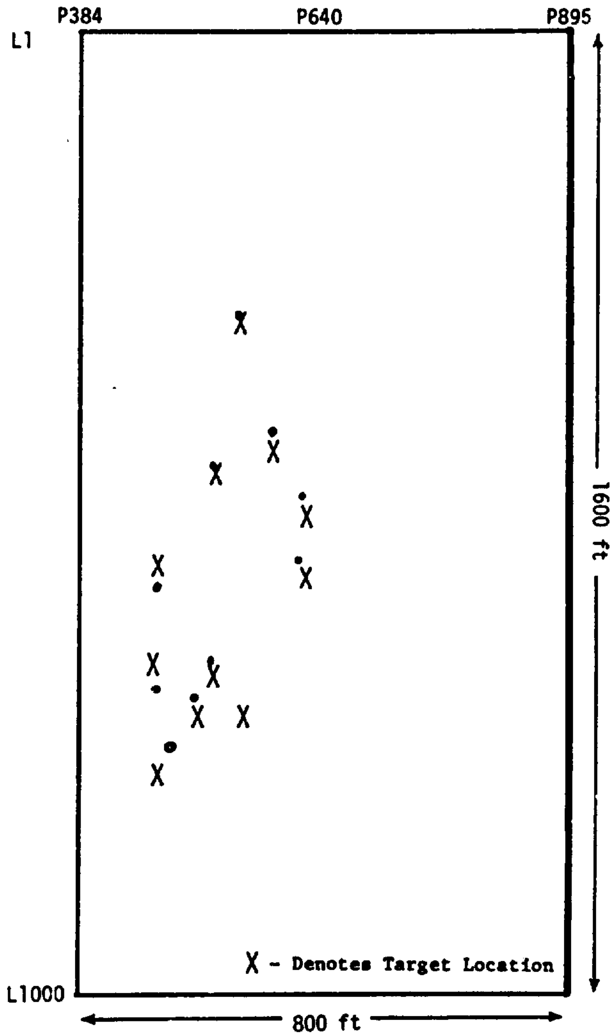
1234 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	259
7	TO	10	22	TO	32	78
10	TO	12	32	TO	39	33
12	TO	14	39	TO	45	23
14	TO	16	45	TO	52	10
16	TO	17	52	TO	55	7
17	TO	20	55	TO	65	16
20	TO	22	65	TO	72	5
22	TO	24	72	TO	78	6
24	TO	26	78	TO	85	5
26	TO	28	85	TO	91	4
28	TO	30	91	TO	98	3
30	TO	32	98	TO	104	4
32	TO	39	104	TO	127	5
39	TO	45	127	TO	147	4
45	TO	55	147	TO	180	3
55	TO	71	180	TO	232	3
71	TO	100	232	TO	328	5
	OVER	100		OVER	328	13

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	9
1.2	TO	1.3	9
1.3	TO	1.4	86
1.4	TO	1.5	48
1.5	TO	1.6	29
1.6	TO	1.7	70
1.7	TO	1.8	31
1.8	TO	1.9	21
1.9	TO	2.0	39
2.0	TO	2.4	63
2.4	TO	2.6	18
2.6	TO	2.8	11
2.8	TO	3.0	11
3.0	TO	3.5	16
3.5	TO	4.0	4
4.0	TO	4.5	3
	OVER	4.5	18



Area: Camp A.P. Hill (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 282.00 Kelvin
Std. Dev. = σ = 1.26 Kelvin
EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 282.00 Kelvin

σ = 1.26 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
0.6	TO	5.0	7
5.0	TO	10.0	3
10.0	TO	15.0	1
15.0	TO	20.0	0
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 12

7 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	2
7	TO	10	22	TO	32	5
10	TO	12	32	TO	39	2
12	TO	14	39	TO	45	1
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	1
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
	OVER	100		OVER	328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	1
1.3	TO	1.4	3
1.4	TO	1.5	3
1.5	TO	1.6	1
1.6	TO	1.7	1
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	0
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	1

Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 279.50 Kelvin
Std. Dev. = σ = 1.54 Kelvin
EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 8.0 - 14.0 μm

Mean = 279.50 Kelvin

σ = 1.54 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.6 TO 5.0	219
5.0 TO 10.0	30
10.0 TO 15.0	9
15.0 TO 20.0	6
20.0 TO 25.0	5
25.0 TO 30.0	1
30.0 TO 35.0	1
35.0 TO 40.0	2
40.0 TO 45.0	1
45.0 TO 50.0	1
50.0 TO 75.0	3
75.0 TO 100.0	1
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	1
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 281

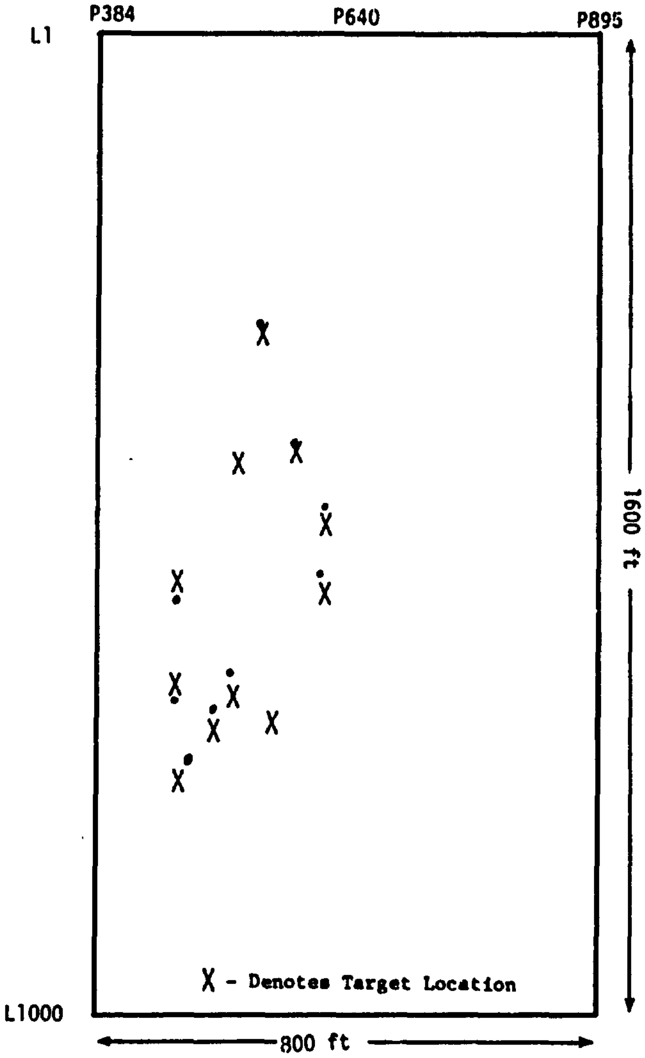
187 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	132
7 TO 10	22 TO 32	56
10 TO 12	32 TO 39	15
12 TO 14	39 TO 45	19
14 TO 16	45 TO 52	11
16 TO 17	52 TO 55	3
17 TO 20	55 TO 65	7
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	2
24 TO 26	78 TO 85	4
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	2
30 TO 32	98 TO 104	2
32 TO 39	104 TO 127	5
39 TO 45	127 TO 147	6
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	3
OVER 100	OVER 328	5

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	16
1.2 TO 1.3	21
1.3 TO 1.4	82
1.4 TO 1.5	29
1.5 TO 1.6	25
1.6 TO 1.7	21
1.7 TO 1.8	20
1.8 TO 1.9	11
1.9 TO 2.0	11
2.0 TO 2.4	21
2.4 TO 2.6	10
2.6 TO 2.8	3
2.8 TO 3.0	4
3.0 TO 3.5	0
3.5 TO 4.0	3
4.0 TO 4.5	3
OVER 4.5	1



Area: Camp A.P. Hill (Wavelength = 8.0 - 14.0 μm)
Tempurature Threshold = Mean + 3.00 σ
Mean = 279.50 Kelvin
Std. Dev. = σ = 1.54 Kelvin
EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

BY AREA

Threshold = Mean + 3.00 σ
Wavelength = 8.0 - 14.0 μm
Mean = 279.50 Kelvin
σ = 1.54 Kelvin

SQUARE METERS	FREQUENCY
0.6 TO 5.0	8
5.0 TO 10.0	1
10.0 TO 15.0	0
15.0 TO 20.0	0
20.0 TO 25.0	0
25.0 TO 30.0	0
30.0 TO 35.0	0
35.0 TO 40.0	0
40.0 TO 45.0	0
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 9

4 FEATURES WITH AREAS LESS THAN 0.60 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	3
7 TO 10	22 TO 32	2
10 TO 12	32 TO 39	3
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

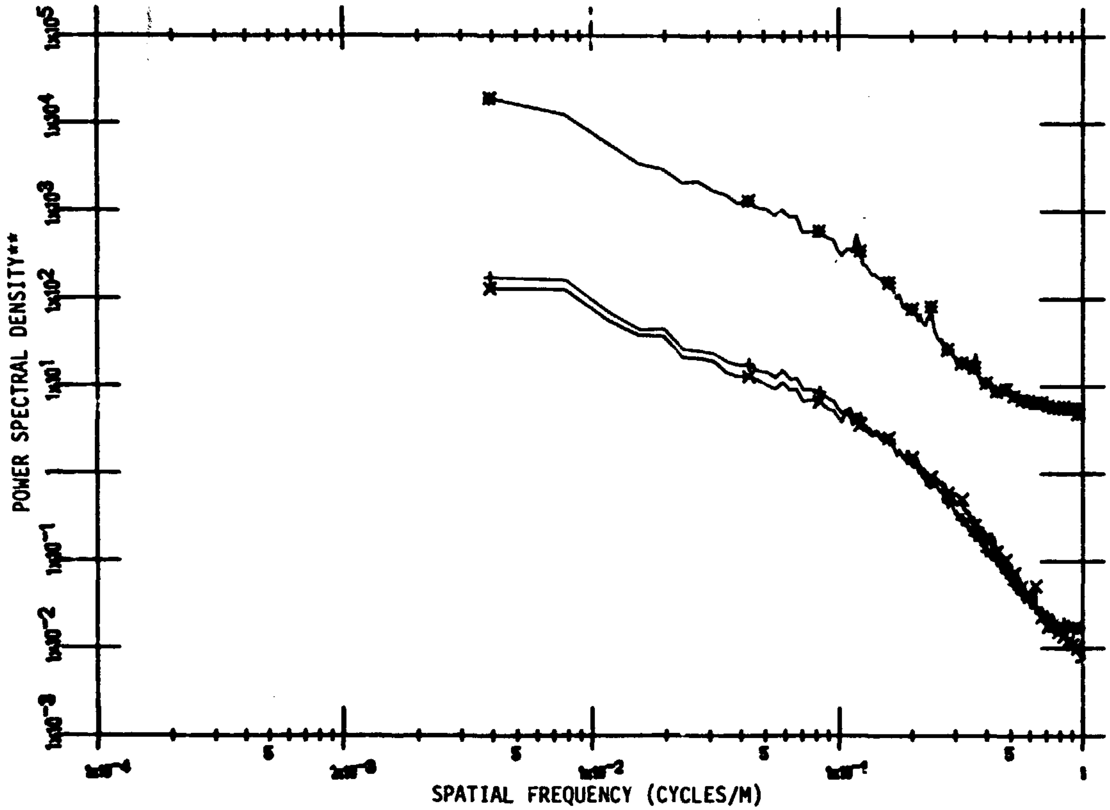
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	2
1.2 TO 1.3	1
1.3 TO 1.4	2
1.4 TO 1.5	2
1.5 TO 1.6	1
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	1
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

CAMP A. P. HILL, VIRGINIA

Power Spectra

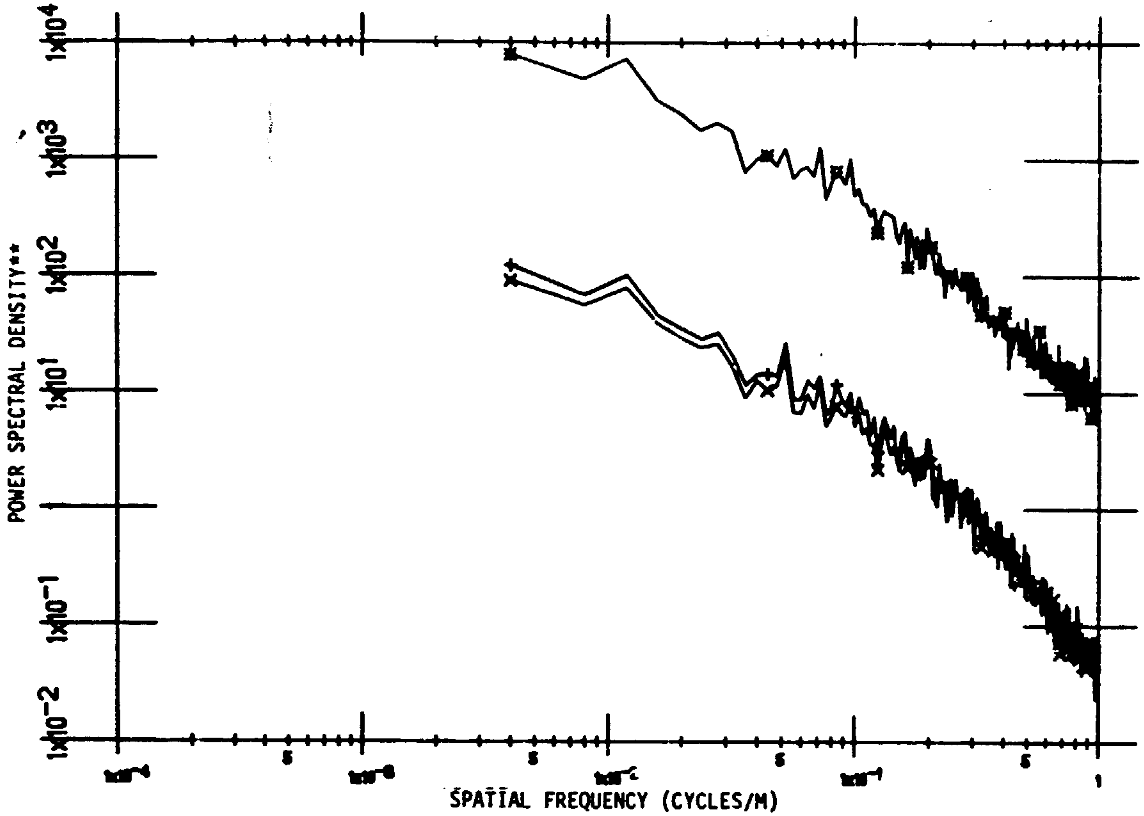
Spectral Bands: 2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 14.0 μm



Area: CAMP A.P. HILL CROSS-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - MORNING

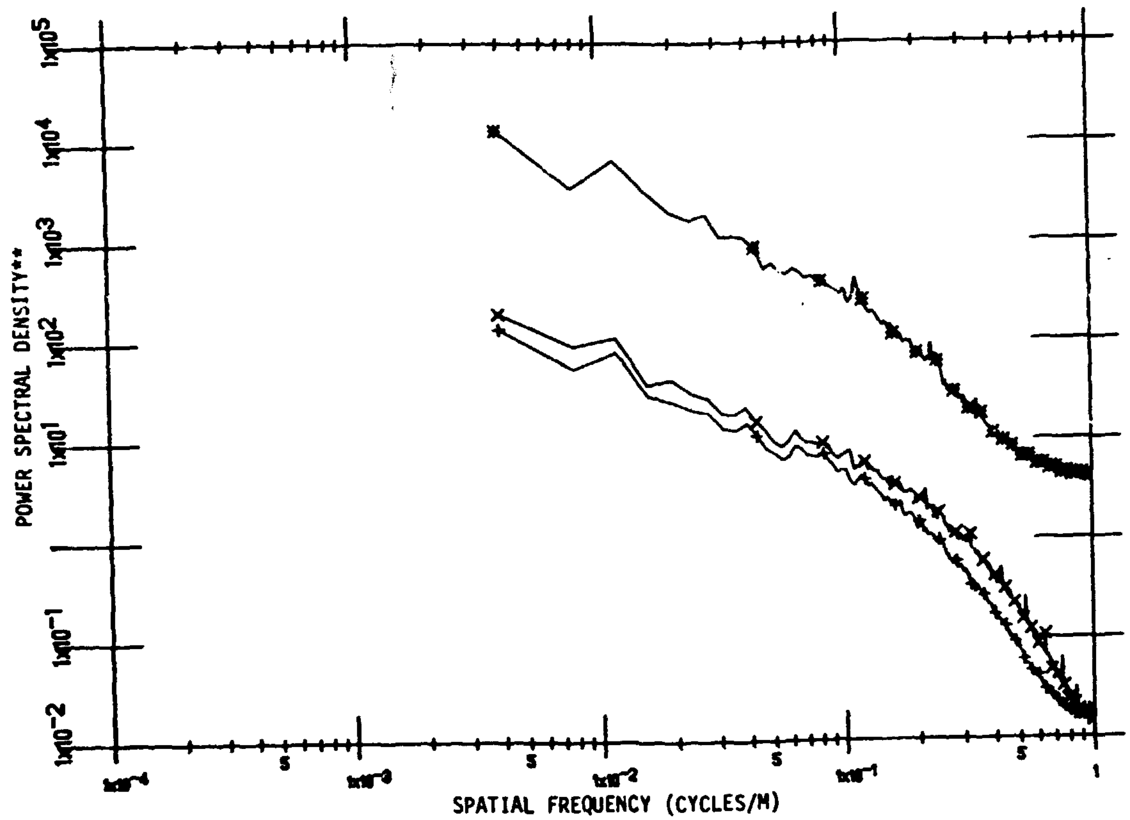
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 µm band, and $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 µm bands.



Area: CAMP A.P. HILL IN-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - MORNING

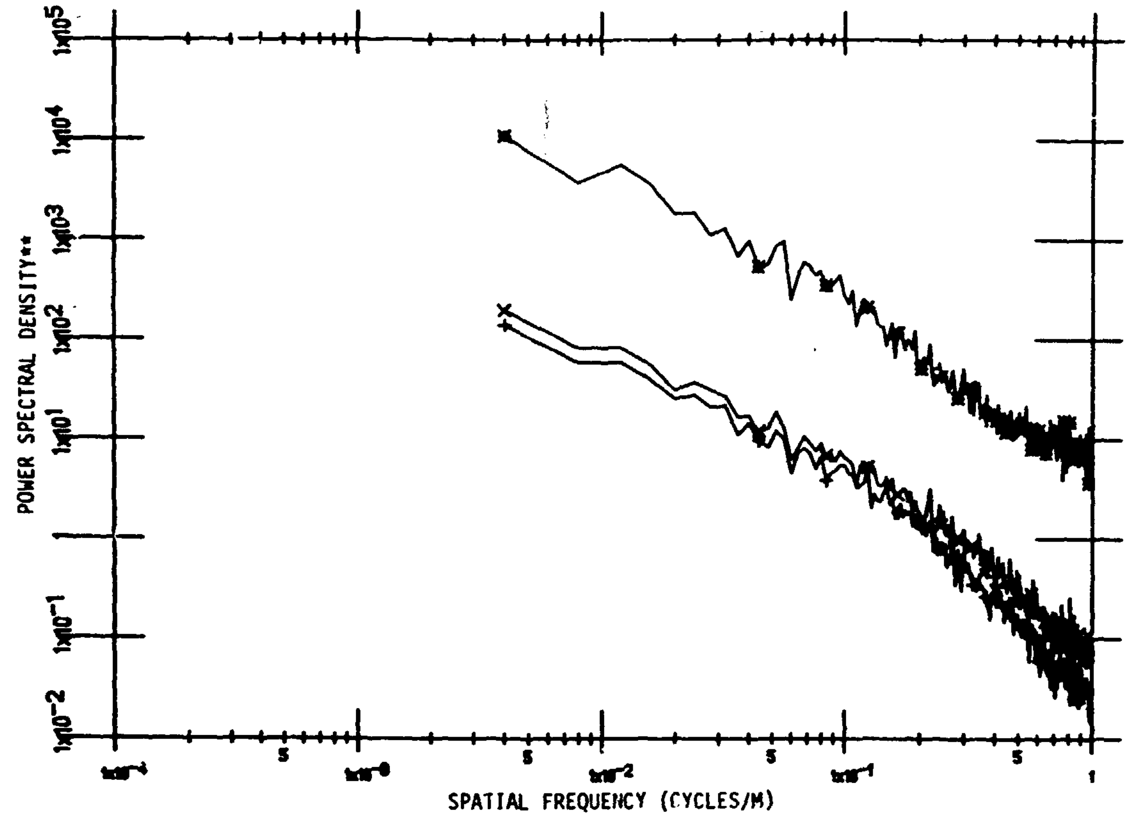
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 µm band, and $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 µm bands.



Area: CAMP A.P. HILL CROSS-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - AFTERNOON

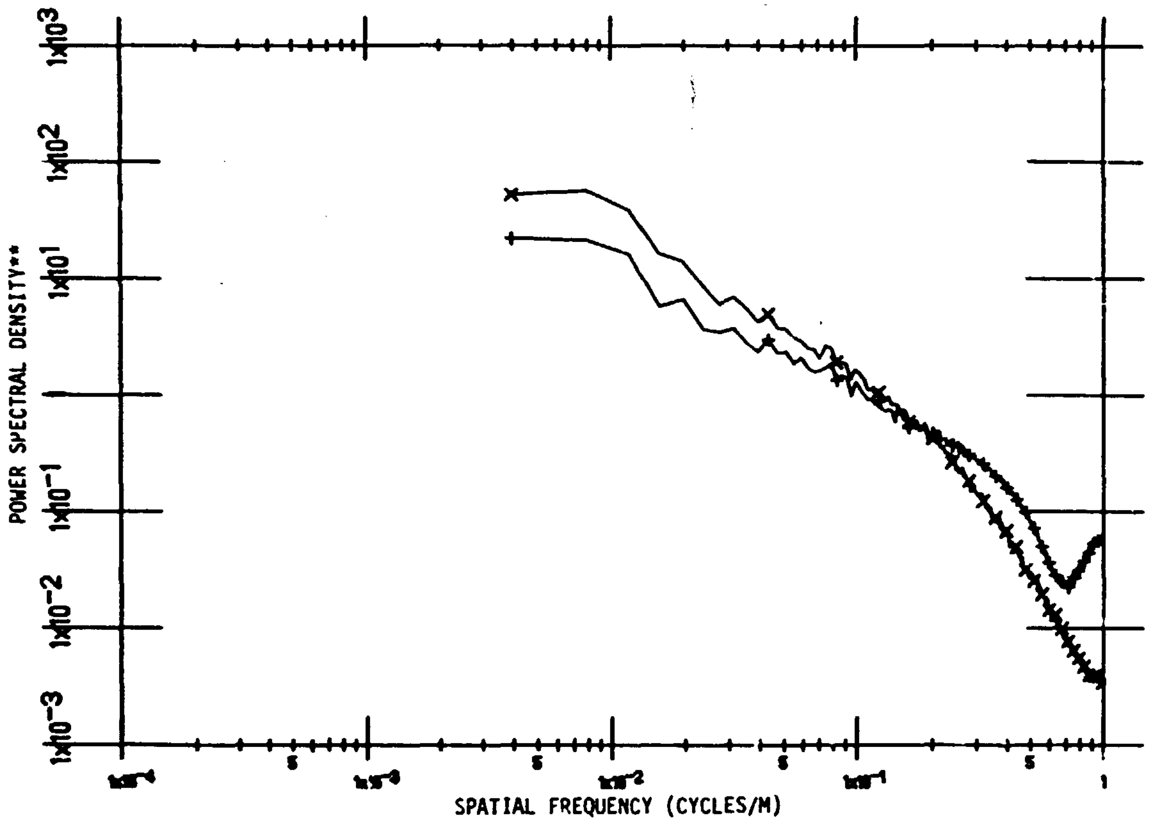
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.



Area: CAMP A.P. HILL IN-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - AFTERNOON

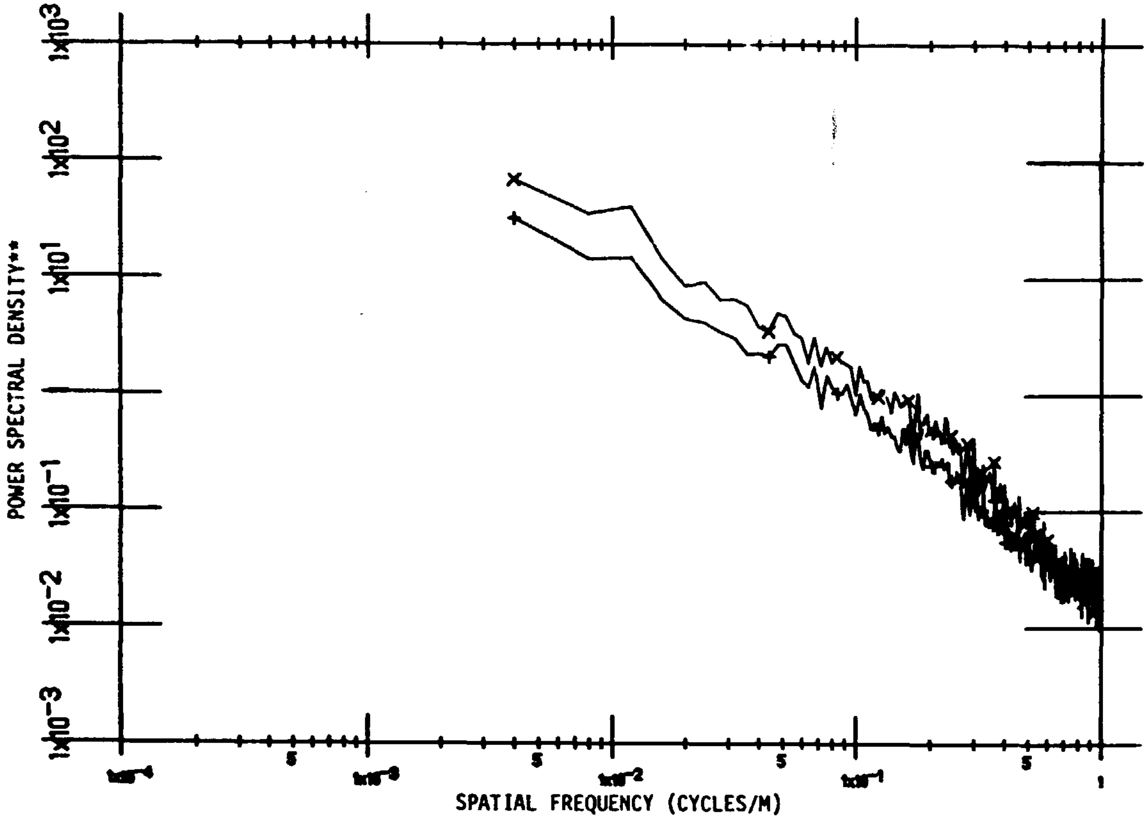
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 µm band, and $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 µm bands.



Area: CAMP A.P. HILL CROSS-TRACK Wavelength = 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - EVENING

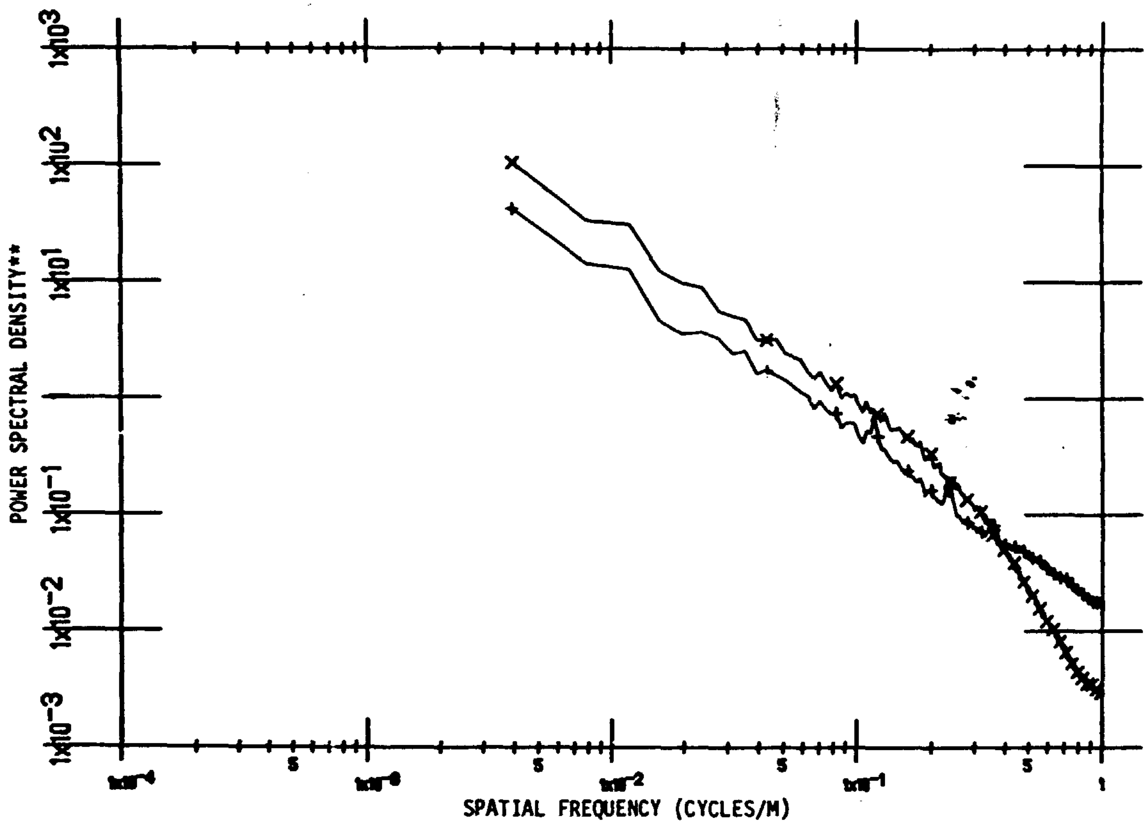
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.



Area: CAMP A.P. HILL IN-TRACK Wavelength = 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - EVENING

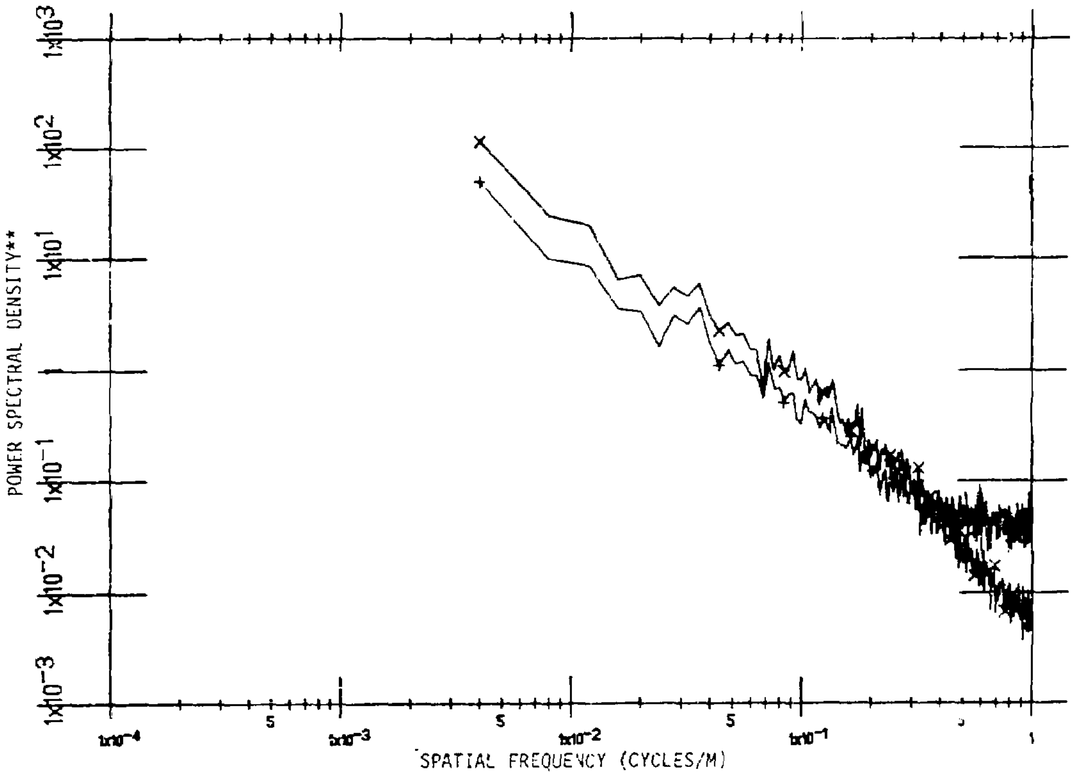
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.



Area: CAMP A.P. HILL CROSS-TRACK Wavelength = 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - MIDNIGHT

**Power spectral density is $(^\circ K)^2$/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 µm bands.



Area: CAMP A.P. HILL IN-TRACK Wavelength = 4.5-5.5 (+), 8.0-14.0 (X)

POWER SPECTRA - MIDNIGHT

**Power spectral density is (°K)²/cycle/meter for the 4.5 to 5.5 and 8.0 to 14.0 μm bands.

FLINT, MICHIGAN*

Pertinent Scene and Flight Information

(Date of Flight: 18 September 1971)

*For specific discussions of these and associated data for this scenery, refer to Reference 1.

FLINT-1 Data

Wavelength Bands:
1.0-1.4 μm, 1.5-1.8 μm, 2.0-2.6 μm, 9.3-11.7 μm

IFOV: 2.5 mrad (cross-track); 5.0 mrad (in-track)

Altitude: 1000 ft   Depression Angle: 90°

Time: 1130 hrs   Flight Direction: South

Ground Speed: 200 $ft\text{-}sec^{-1}$

Area Covered (Approx.): 1600 ft wide x 4000 ft long

Meteorology: Visibility > 10 mi; dry; cloud cover 30-50%

FLINT-2 Data

Wavelength Bands:
1.0-1.4 μm, 1.5-1.8 μm, 2.0-2.6 μm, 9.3-11.7 μm

IFOV: 2.5 mrad (cross-track); 5.0 mrad (in-track)

Altitude: 1000 ft   Depression Angle: 90°

Time: 1200 hrs   Flight Direction: Southeast

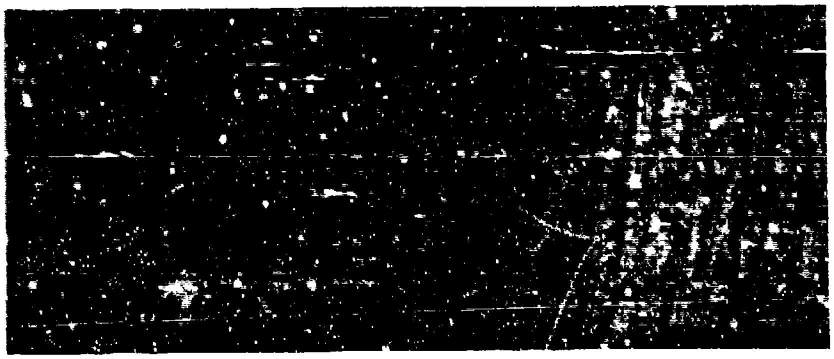
Ground Speed: 200 $ft\text{-}sec^{-1}$

Area Covered (Approx.): 1600 ft wide x 4500 ft long

Meteorology: Visibility > 10 mi; dry, cloud cover 30-50%

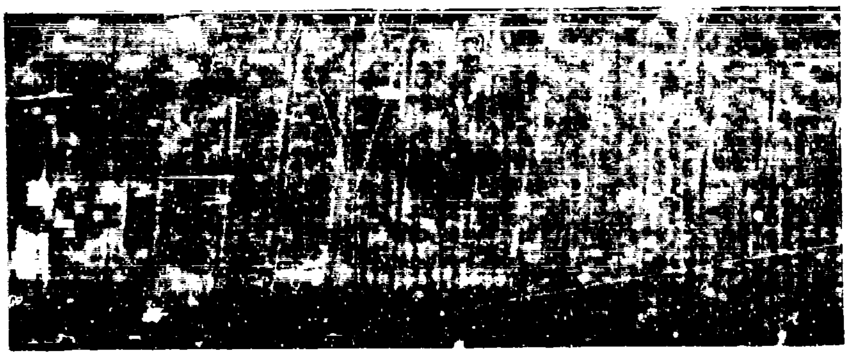
AERIAL PHOTOGRAPH - FLINT-1

AERIAL PHOTOGRAPH - FLINT-2

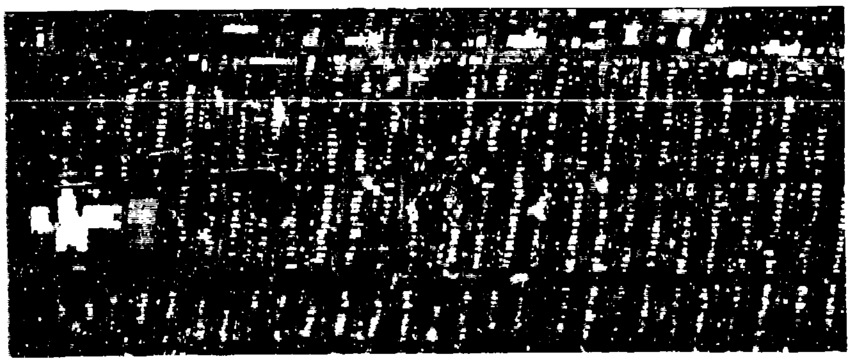


1.0 - 1.4 μm

1.5 - 1.8 μm



2.0 - 2.6 μm



9.3 - 11.7 μm

LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNEL OF FLINT-1

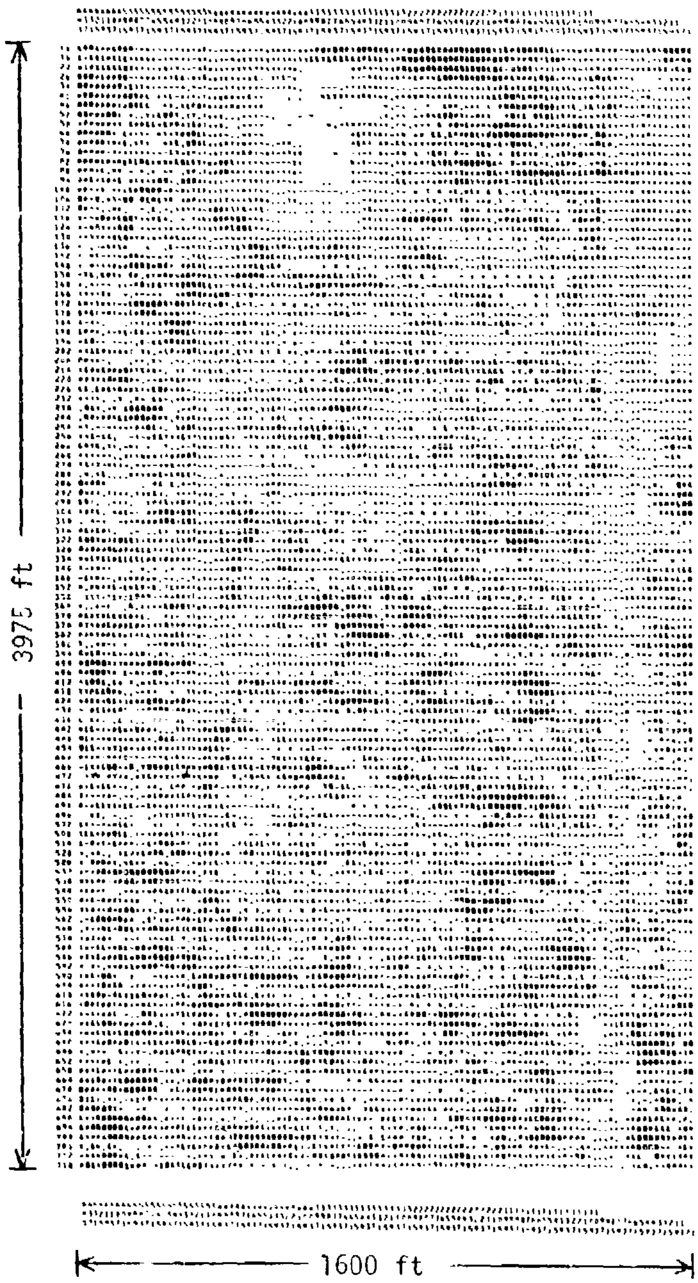
1.0 - 1.4 µm

1.5 - 1.8 µm

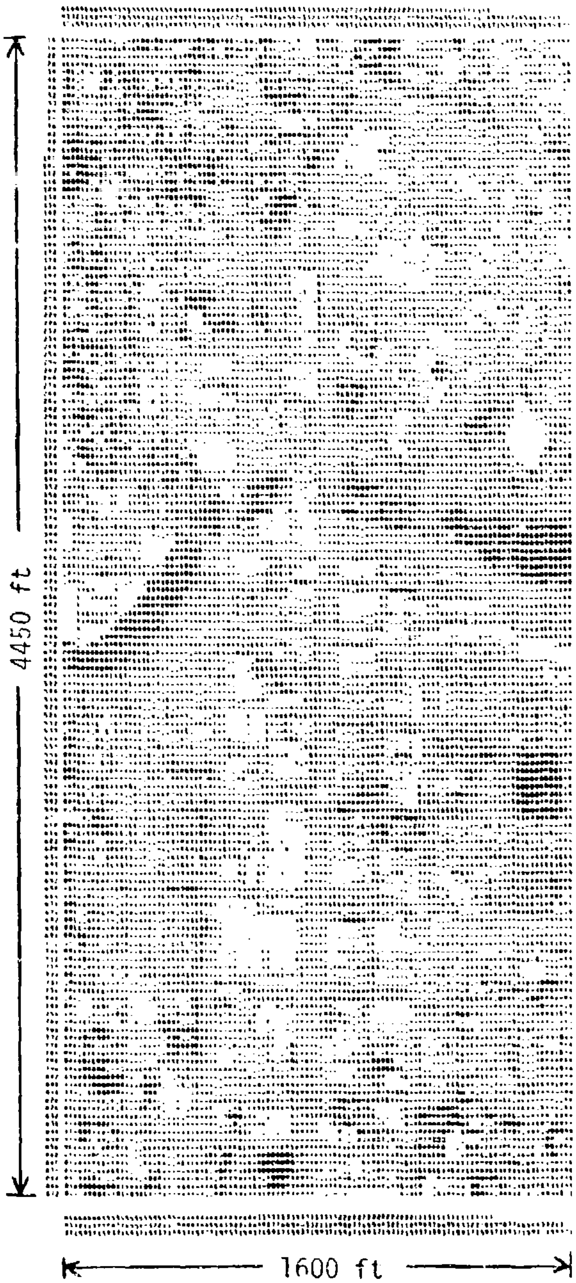
2.0 - 2.6 µm

9.3 - 11.7 µm

LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF FLINT-2



GREYMAP OF FLINT 1



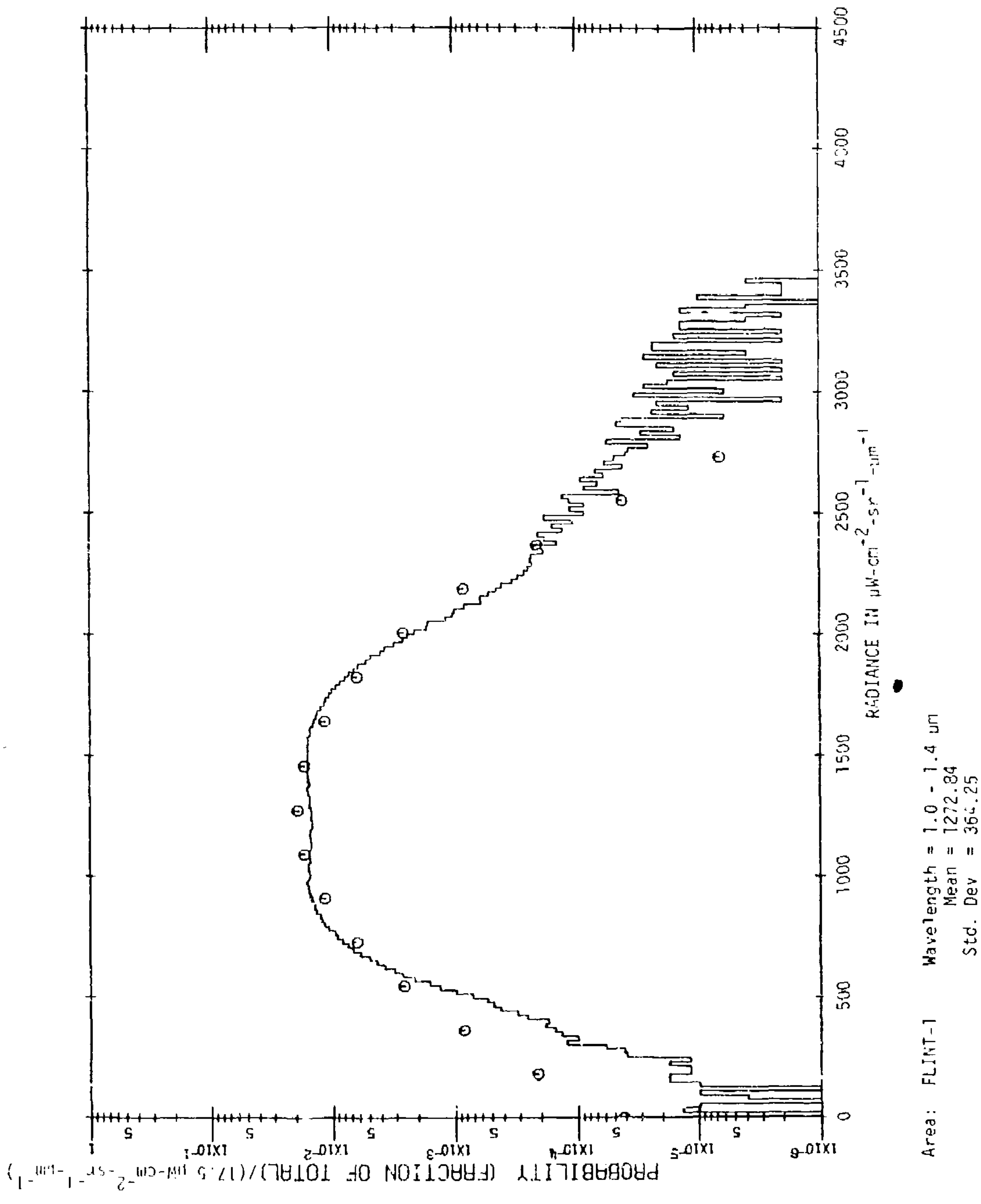
GREYMAP OF FLINT-2

FLINT, MICHIGAN

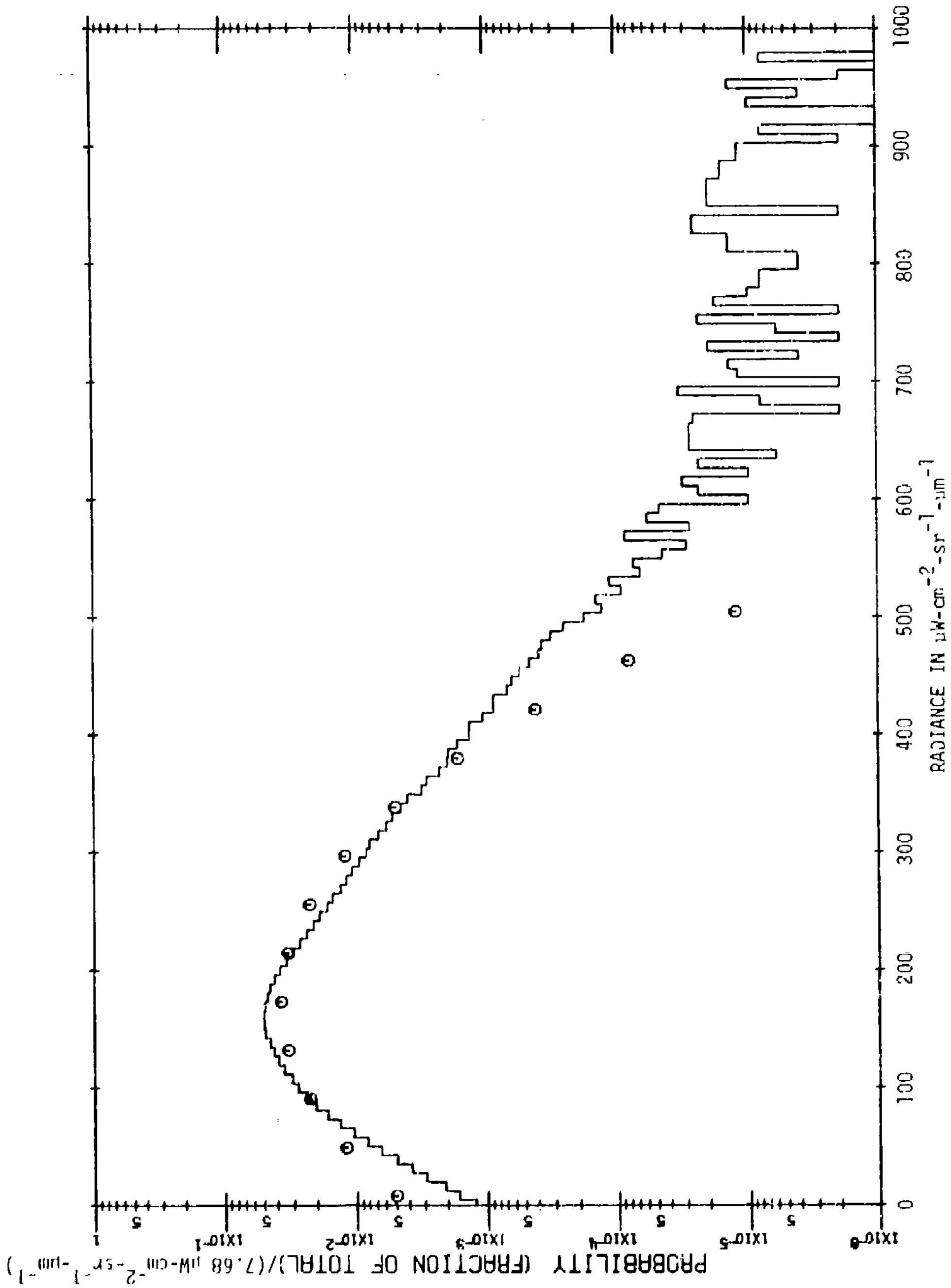
Histograms*

Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
9.3 - 11.7 μm

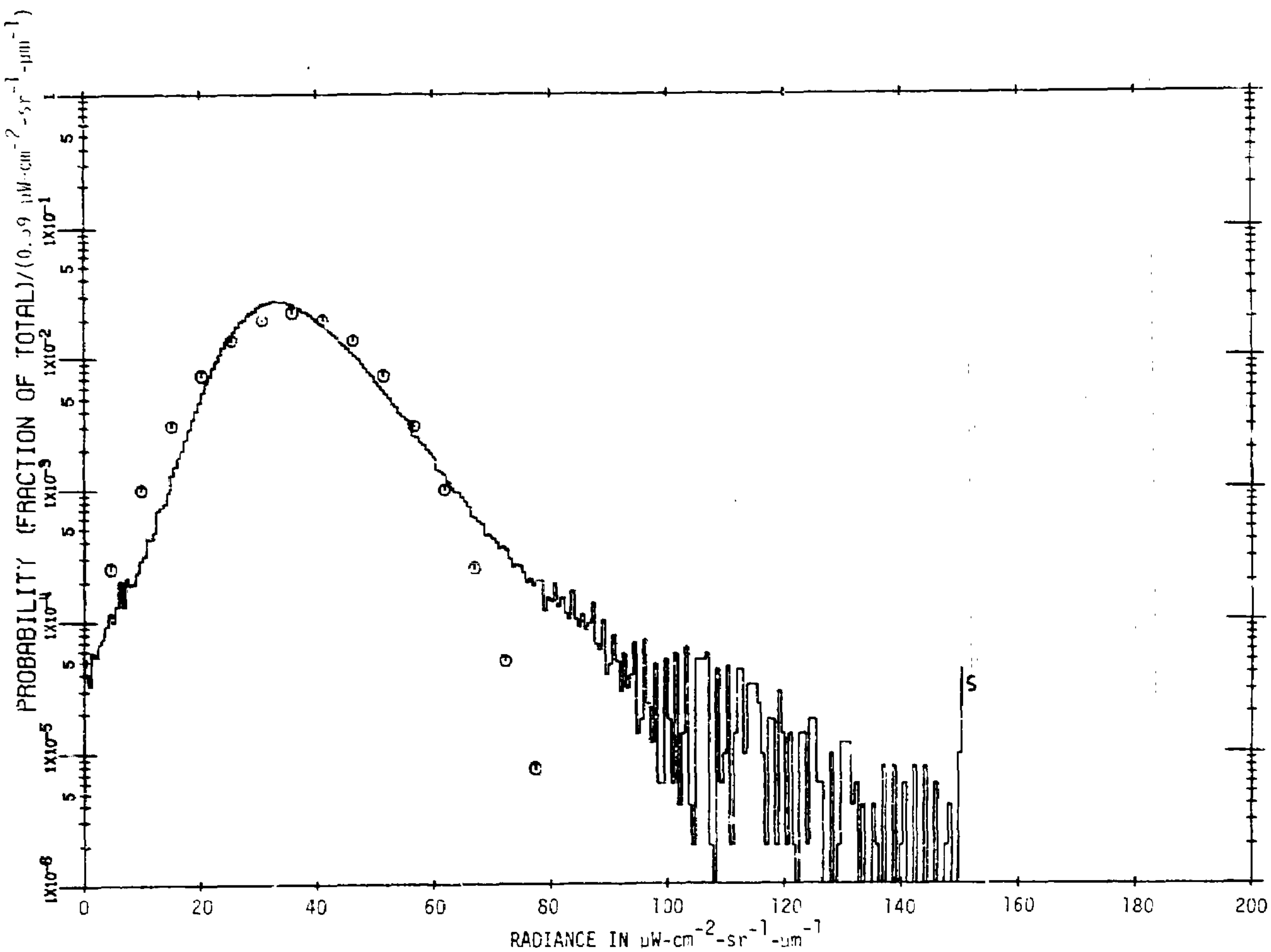
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



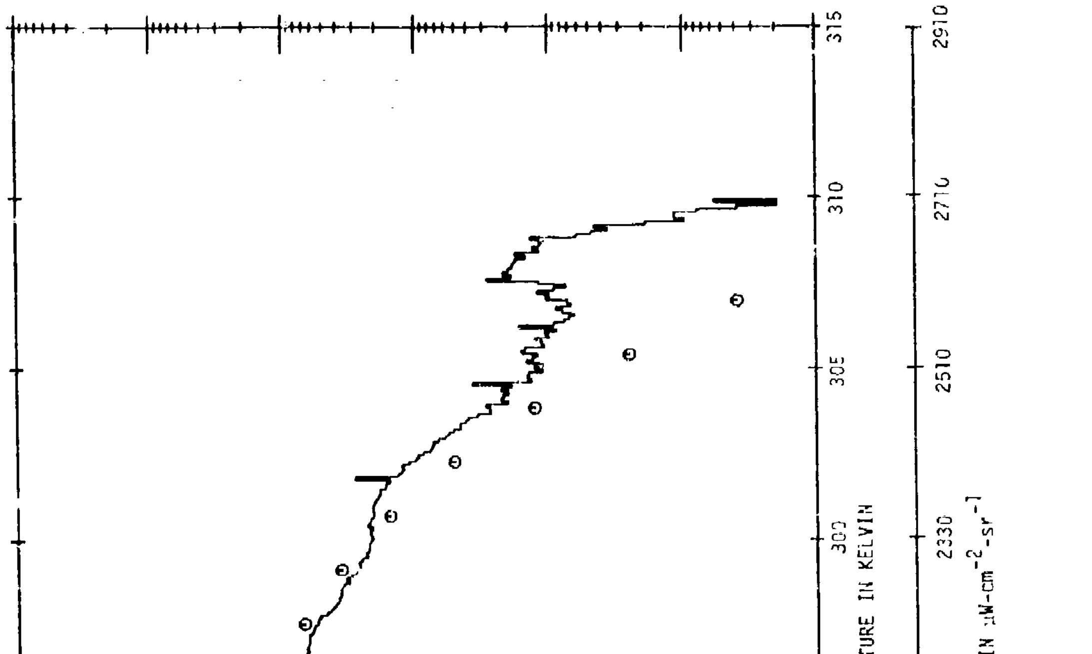
PROBABILITY (FRACTION OF TOTAL)/(17.5 µW-cm^{-2}-sr^{-1}-µm^{-1})
RADIANCE IN µW-cm^{-2}-sr^{-1}-µm^{-1}
0
500
1000
1500
2000
2500
3000
3500
4000
4500
1
1X10^{-1}
1X10^{-2}
1X10^{-3}
1X10^{-4}
1X10^{-5}
1X10^{-6}
5
Area: FLINT-1
Wavelength = 1.0 - 1.4 µm
Mean = 1272.84
Std. Dev = 364.25

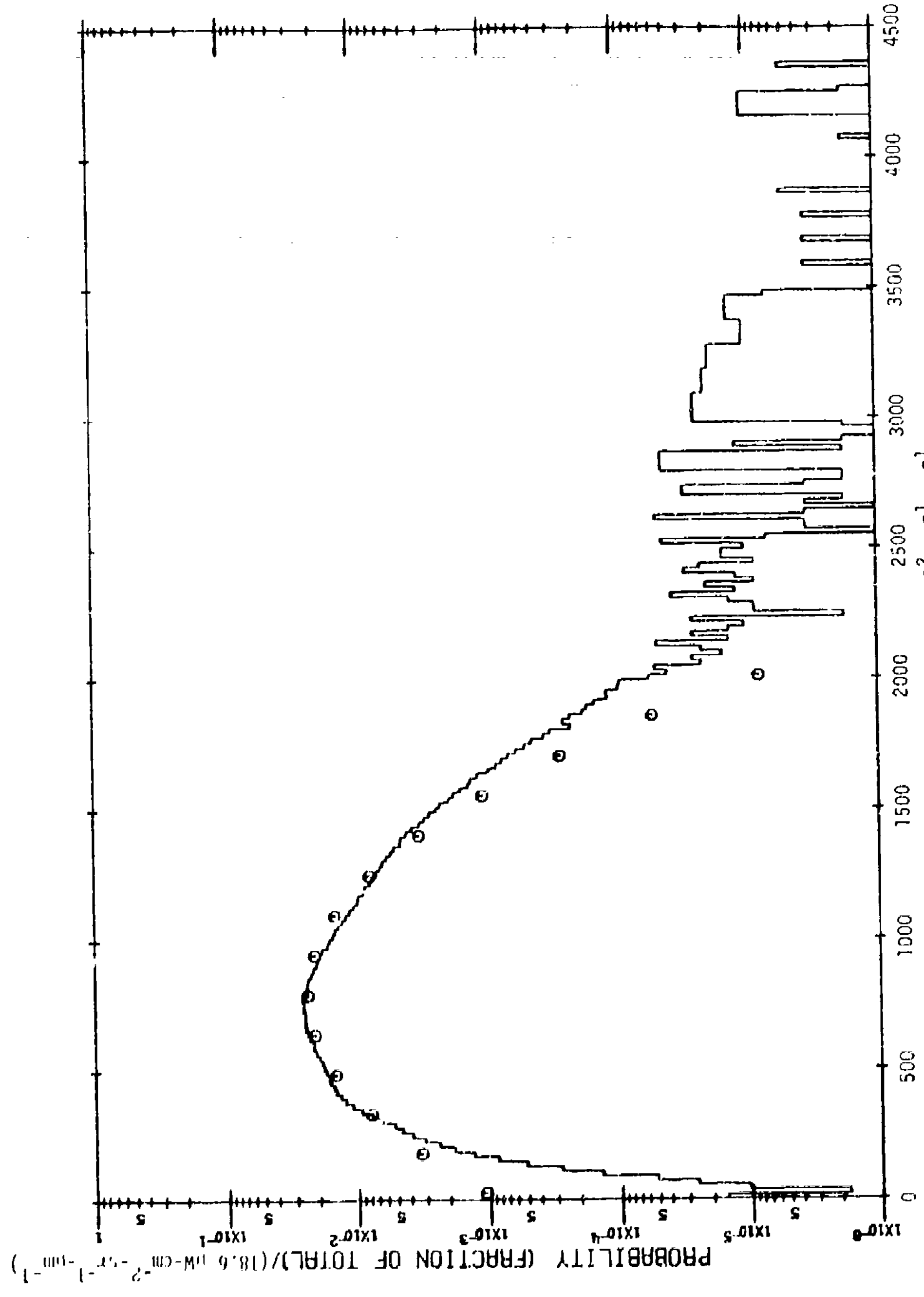


Area: FLINT-1 Wavelength = 1.5 - 1.8 µm
Mean = 173.16
Std. Dev. = 82.74

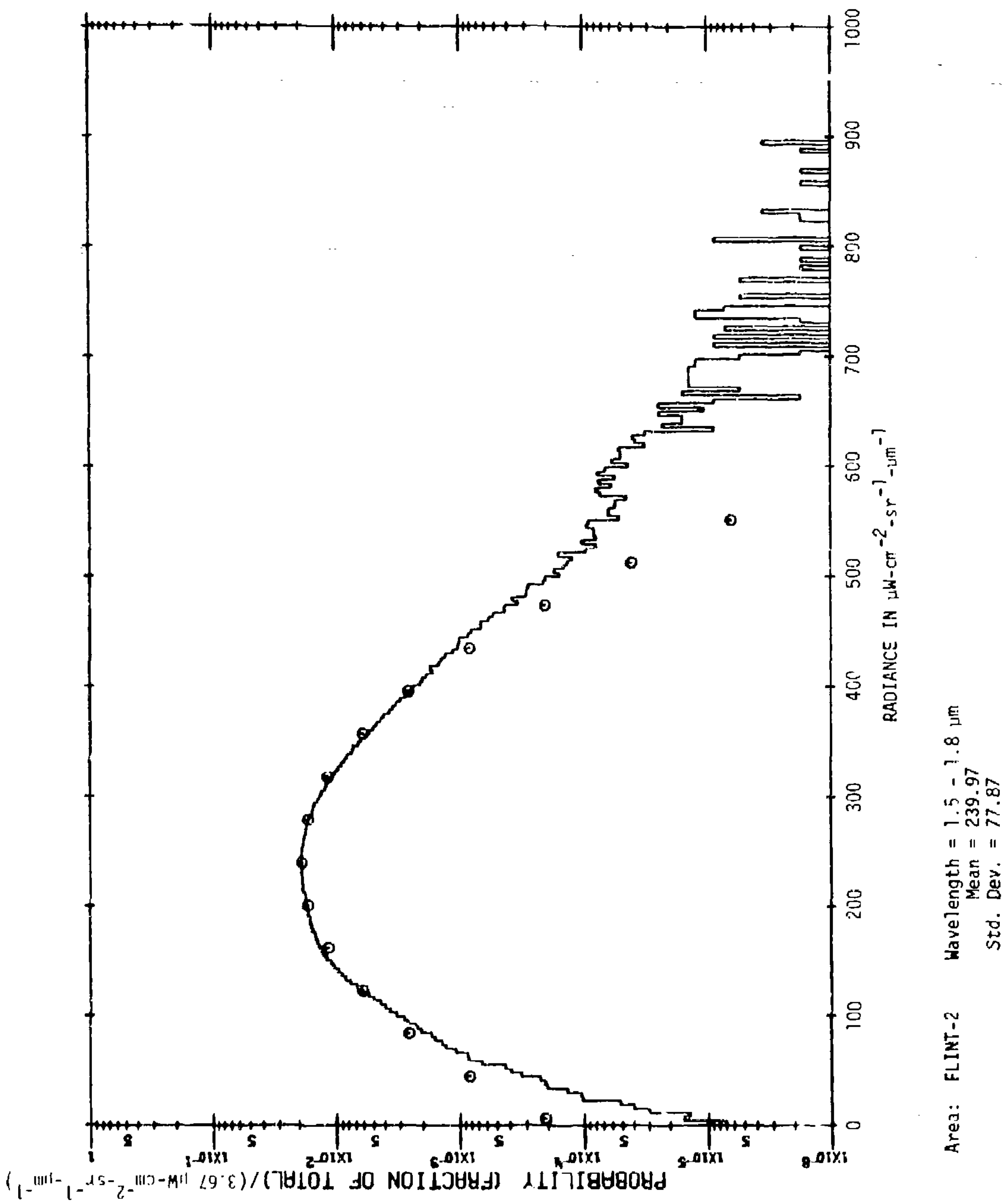


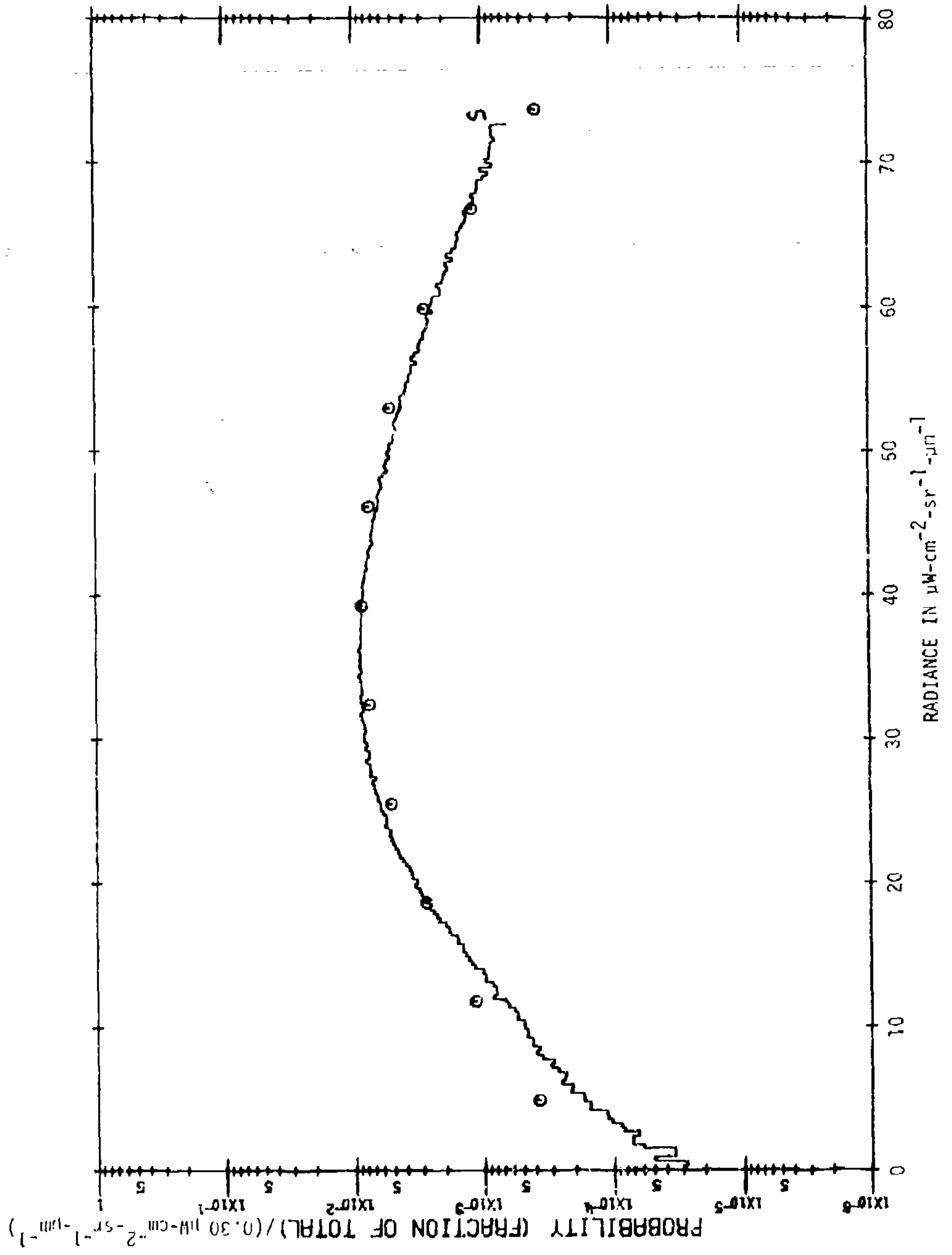
Area: FLINT-1 Wavelength = 2.0 - 2.6 um
Mean = 35.84
Std. Dev. = 10.39


PROBABILITY (FRACTION OF TOTAL)/(0.09 K)
TEMPERATURE IN KELVIN
RADIANCE IN μW-cm^{-2}-sr^{-1}
280
285
290
295
300
305
310
315
1670
1830
1990
2150
2330
2510
2710
2910
1X10^{-6}
1X10^{-5}
1X10^{-4}
1X10^{-3}
1X10^{-2}
1X10^{-1}
1
Area: FLINT-1
Wavelength = 9.3 - 11.7 μm
Mean = 294.43
Std. Dev. = 3.14

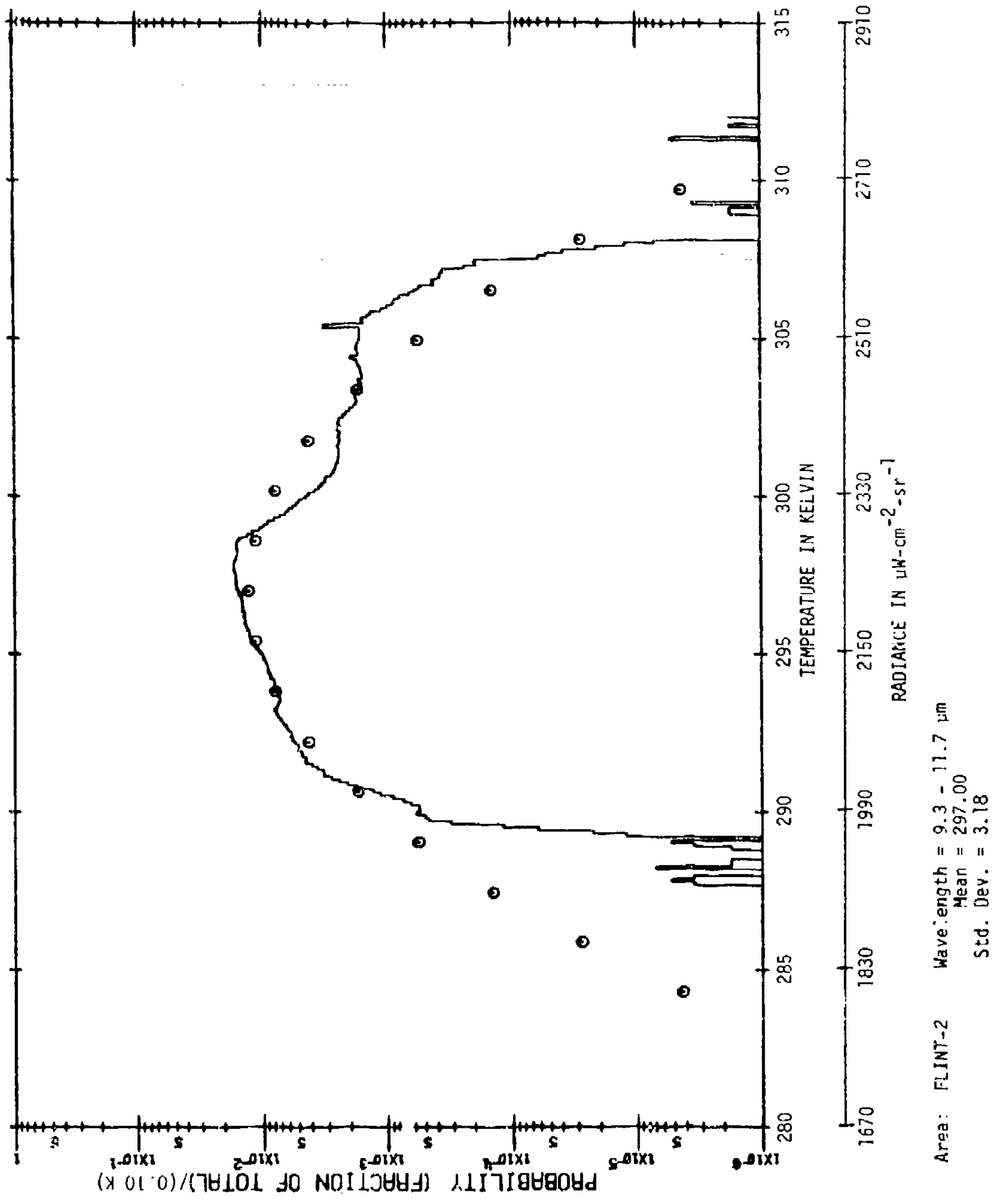


Area: FLINT-2 Wavelength = 1.0 - 1.4 µm
Mean = 789.97
Std. Dev. = 305.08


PROBABILITY (FRACTION OF TOTAL)/(3.67 µW-cm⁻²-sr⁻¹-µm⁻¹)
1
5
1X10⁻¹
1X10⁻²
1X10⁻³
1X10⁻⁴
1X10⁻⁵
1X10⁻⁶
0
100
200
300
400
500
600
700
800
900
1000
RADIANCE IN µW-cm⁻²-sr⁻¹-µm⁻¹
Area: FLINT-2
Wavelength = 1.5 - 1.8 µm
Mean = 239.97
Std. Dev. = 77.87



Area: FLINT-2 Wavelength = 2.0 - 2.6 μm
Mean = 39.25
Std. Dev. = 13.75


PROBABILITY (FRACTION OF TOTAL)/(0.10 K)
TEMPERATURE IN KELVIN
280
285
290
295
300
305
310
315
RADIANCE IN μW-cm-2-sr-1
1670
1830
1990
2150
2330
2510
2710
2910
Area: FLINT-2
Wavelength = 9.3 - 11.7 μm
Mean = 297.00
Std. Dev. = 3.18

FLINT, MICHIGAN

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: Channel 2: 1.0 - 1.4 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 3: 1.5 - 1.8 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 4: 2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 5: 9.3 - 11.7 μm (°K)

*Because of the relatively small temperature changes in the scenery, there is a nearly linear relationship between the temperature and radiance statistics for the thermal channels. It is pertinent, therefore, to compute correlations between radiance and temperature channels.

FLINT-1

Number of Subregions = 1

Pixel Subarea Divisions at: 1 645

Line Subarea Divisions at: 10 806

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
3 (1.5 - 1.8 μm)
4 (2.0 - 2.6 μm)
5 (9.3 - 11.7 μm)

Correlation	2	3	4	5
2	1.000			
3	0.392	1.000		
4	0.303	0.603	1.000	
5	-0.455	0.048	0.177	1.000

Channels	2	3	4	5
Mean	1.2728E+03	1.7316E+02	3.5843E+01	2.9443E+02
St. Dev.	3.6425E+02	8.2745E+01	1.0386E+01	3.1403E+00
Total Points	514065	514065	514065	514065

FLINT-2

Number of Subregions = 1

Pixel Subarea Divisions at: 1 645

Line Subarea Divisions at: 10 896

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
3 (1.5 - 1.8 μm)
4 (2.0 - 2.6 μm)
5 (9.3 - 11.7 μm)

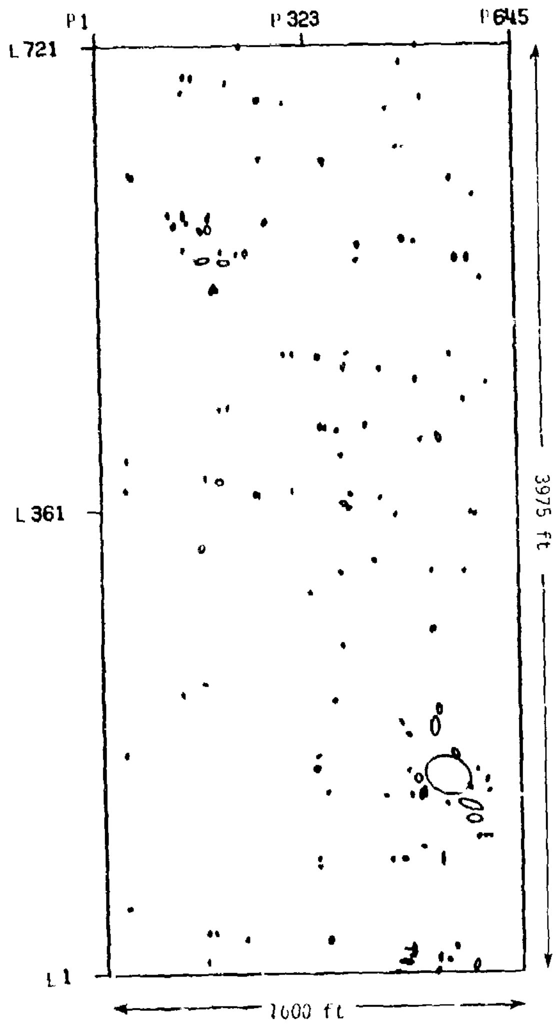
Correlation	2	3	4	5
2	1.000			
3	0.718	1.000		
4	0.489	0.634	1.000	
5	-0.437	-0.180	-0.036	1.000

Channels	2	3	4	5
Mean	7.8997E+02	2.3997E+02	3.9247E+01	2.9700E+02
St. Dev.	3.0508E+02	7.7870E+01	1.3748E+01	3.1768E+00
Total Points	572115	572115	572115	572115

FLINT, MICHIGAN

Ellipse Statistics

Spectral Bands: 1.0 - 1.4 μm
9.3 - 11.7 μm



Area: FLINT-1 (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 2.00 σ

Mean = 1272.84 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 364.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

FLINT-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 1.0 - 1.4 μm

Mean = 1272.84 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 364.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	187
100.0 TO 200.0	2
200.0 TO 500.0	1
500.0 TO 1000.0	0
1000.0 TO 1500.0	0
1500.0 TO 2000.0	1
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	0
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 191

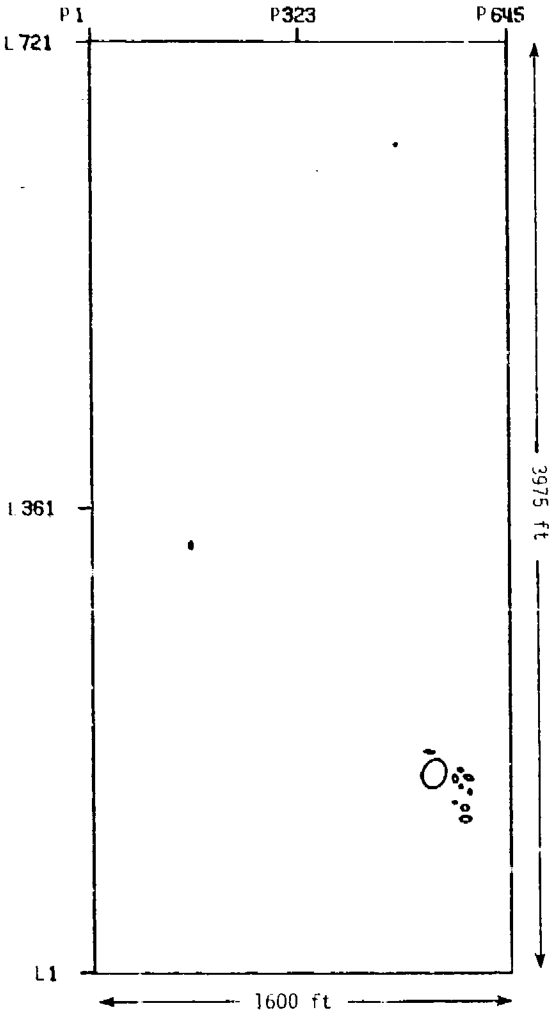
BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	176
50 TO 100	164 TO 328	11
100 TO 150	328 TO 492	2
150 TO 200	492 TO 656	1
200 TO 250	656 TO 820	0
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	1
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	0
1.1 TO 1.2	8
1.2 TO 1.3	9
1.3 TO 1.4	24
1.4 TO 1.5	12
1.5 TO 1.6	18
1.6 TO 1.7	17
1.7 TO 1.8	18
1.8 TO 1.9	11
1.9 TO 2.0	22
2.0 TO 2.2	24
2.2 TO 2.4	10
2.4 TO 2.6	8
2.6 TO 2.8	3
2.8 TO 3.0	1
3.0 TO 3.5	2
3.5 TO 4.0	2
OVER 4.0	1

ERIM



Area: FLINT-1 (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 3.00 σ

Mean = 1272.84 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 364.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

FLINT-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 1.0 - 1.4 μm

Mean = 1272.84 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 364.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	16
100.0 TO 200.0	0
200.0 TO 500.0	0
500.0 TO 1000.0	1
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	0
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

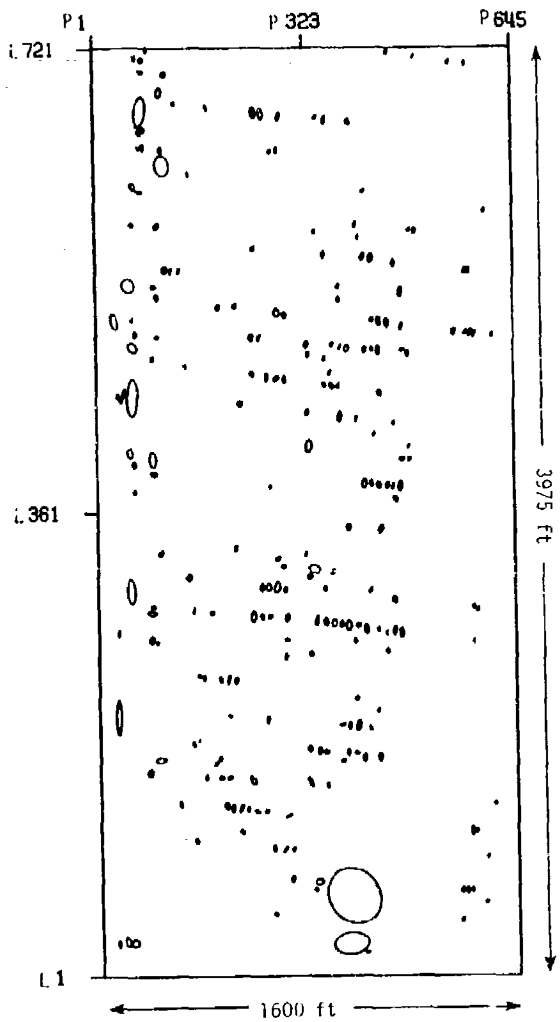
TOTAL NUMBER OF ELLIPTICAL AREAS = 17

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	12
50 TO 100	164 TO 328	4
100 TO 150	328 TO 492	0
150 TO 200	492 TO 656	0
200 TO 250	656 TO 820	0
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	1
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	2
1.2 TO 1.3	1
1.3 TO 1.4	3
1.4 TO 1.5	1
1.5 TO 1.6	3
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	0
1.9 TO 2.0	1
2.0 TO 2.2	2
2.2 TO 2.4	2
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
OVER 4.0	1



Area: FLINT-I (Wavelength = 9.3 - 11.7 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 294.43 Kelvin
Std. Dev. - σ = 3.14 Kelvin
EQUIVALENT ELLIPTICAL AREAS

FLINT-1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 9.3 - 11.7 μm

Mean = 294.43 Kelvin

σ = 3.14 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	271
100.0 TO 200.0	4
200.0 TO 500.0	4
500.0 TO 1000.0	1
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	1
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

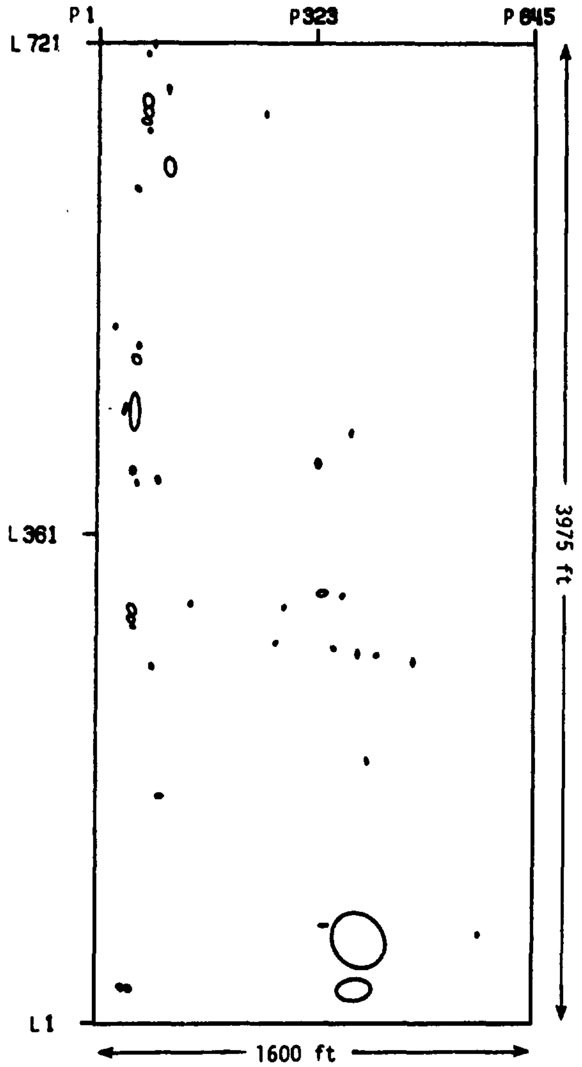
TOTAL NUMBER OF ELLIPTICAL AREAS = 281

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	269
50 TO 100	164 TO 328	5
100 TO 150	328 TO 492	4
150 TO 200	492 TO 656	1
200 TO 250	656 TO 820	1
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	1
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	1
1.1 TO 1.2	27
1.2 TO 1.3	33
1.3 TO 1.4	44
1.4 TO 1.5	29
1.5 TO 1.6	51
1.6 TO 1.7	27
1.7 TO 1.8	28
1.8 TO 1.9	11
1.9 TO 2.0	11
2.0 TO 2.2	12
2.2 TO 2.4	4
2.4 TO 2.6	0
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
OVER 4.0	1



Area: FLINT-1 (Wavelength 9.3 - 11.7 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 294.43 Kelvin
Std. Dev. = σ = 3.14 Kelvin
EQUIVALENT ELLIPTICAL AREAS

FLINT-1
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 9.3 - 11.7 μm
Mean = 294.43 Kelvin
σ = 3.14 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	48
100.0 TO 200.0	2
200.0 TO 500.0	1
500.0 TO 1000.0	1
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	1
3000.0 TO 4000.0	0
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

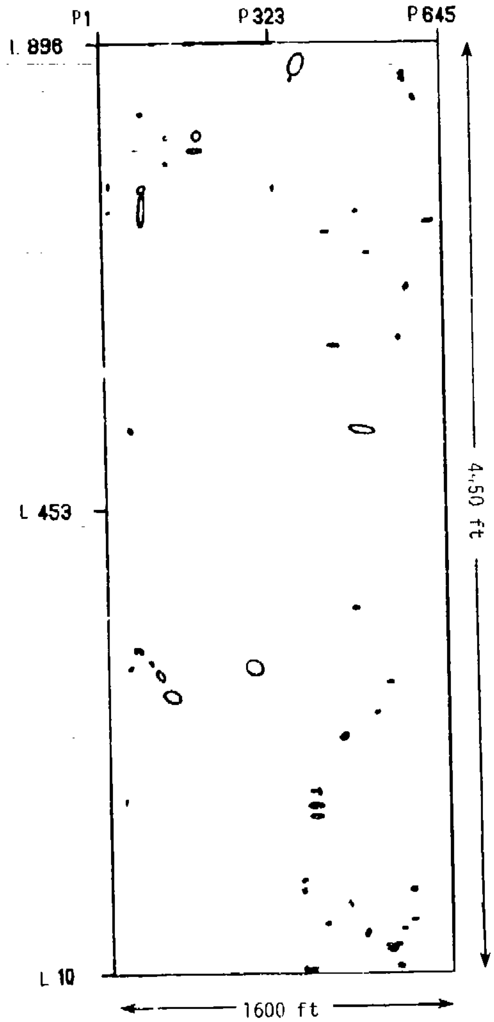
TOTAL NUMBER OF ELLIPTICAL AREAS = 53

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	46
50 TO 100	164 TO 328	3
100 TO 150	328 TO 492	0
150 TO 200	492 TO 656	3
200 TO 250	656 TO 820	0
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	1
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	1
1.1 TO 1.2	3
1.2 TO 1.3	11
1.3 TO 1.4	9
1.4 TO 1.5	6
1.5 TO 1.6	5
1.6 TO 1.7	6
1.7 TO 1.8	2
1.8 TO 1.9	5
1.9 TO 2.0	0
2.0 TO 2.2	1
2.2 TO 2.4	1
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
OVER 4.0	1



Area: FLINT-2 (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 2.85 σ

Mean = 789.97 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = 305.08 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

FLINT-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.85 σ

Wavelength = 1.0 - 1.4 μm

Mean = 789.97 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 305.08 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS		FREQUENCY
4.0 TO	5.0	29
5.0 TO	10.0	52
10.0 TO	15.0	23
15.0 TO	20.0	4
20.0 TO	25.0	3
25.0 TO	30.0	4
30.0 TO	35.0	3
35.0 TO	40.0	0
40.0 TO	45.0	2
45.0 TO	50.0	2
50.0 TO	75.0	2
75.0 TO	100.0	3
100.0 TO	150.0	3
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	1
300.0 TO	400.0	3
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 135

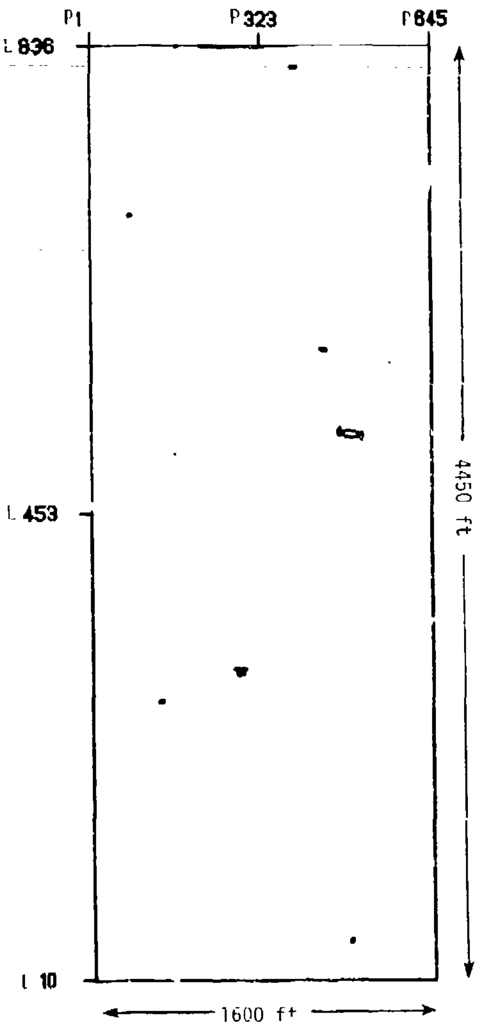
427 FEATURES WITH AREAS LESS THAN 4.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	10
7 TO 10	22 TO 32	16
10 TO 12	32 TO 39	14
12 TO 14	39 TO 45	27
14 TO 16	45 TO 52	14
16 TO 17	52 TO 55	6
17 TO 20	55 TO 65	9
20 TO 22	65 TO 72	4
22 TO 24	72 TO 78	2
24 TO 26	78 TO 85	6
26 TO 28	85 TO 91	1
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	2
32 TO 39	104 TO 127	6
39 TO 45	127 TO 147	3
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	4
OVER 100	OVER 328	7

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	12
1.0 TO 1.1	1
1.1 TO 1.2	17
1.2 TO 1.3	9
1.3 TO 1.4	19
1.4 TO 1.5	16
1.5 TO 1.6	13
1.6 TO 1.7	10
1.7 TO 1.8	5
1.8 TO 1.9	10
1.9 TO 2.0	7
2.0 TO 2.4	9
2.4 TO 2.6	1
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	2
4.0 TO 4.5	2
OVER 4.5	0



Area: FLINT-2 (Wavelength = 1.0 - 1.4 μm)
Radiance Threshold = Mean + 3.75 σ
Mean = 789.97 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 305.08 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

FLINT-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.75 σ

Wavelength = 1.0 - 1.4 μm

Mean = 789.97 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 305.08 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
4.0	TO	5.0	6
5.0	TO	10.0	9
10.0	TO	15.0	2
15.0	TO	20.0	4
20.0	TO	25.0	4
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	1
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 29

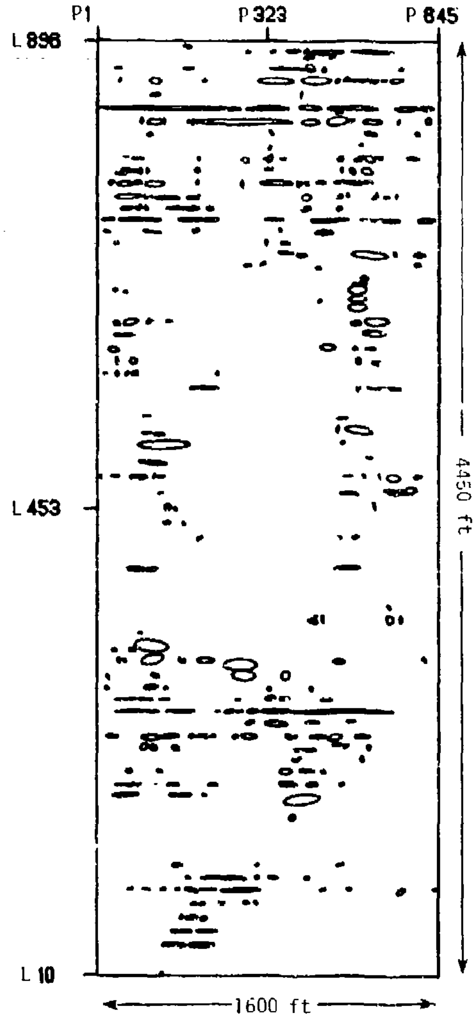
131 FEATURES WITH AREAS LESS THAN 4.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	6
7	TO	10	22	TO	32	1
10	TO	12	32	TO	39	5
12	TO	14	39	TO	45	2
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	3
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	1
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	3
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	1
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	0
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	7
1.0	TO	1.1	1
1.1	TO	1.2	2
1.2	TO	1.3	2
1.3	TO	1.4	3
1.4	TO	1.5	3
1.5	TO	1.6	1
1.6	TO	1.7	3
1.7	TO	1.8	3
1.8	TO	1.9	2
1.9	TO	2.0	0
2.0	TO	2.4	1
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
OVER		4.5	0



Area: FLINT-2 (Wavelength = 9.3 - 11.7 μm)
Temperature Threshold = Mean + 4.50 σ
Mean = 297.00 Kelvin
Std. Dev. = σ = 3.18 Kelvin
EQUIVALENT ELLIPTICAL AREAS

FLINT-2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 4.50 σ

Wavelength = 9.3 - 11.7 μm

Mean = 297.00 Kelvin

σ = 3 18 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
4.0	TO	5.0	106
5.0	TO	10.0	185
10.0	TO	15.0	68
15.0	TO	20.0	44
20.0	TO	25.0	22
25.0	TO	30.0	16
30.0	TO	35.0	24
35.0	TO	40.0	10
40.0	TO	45.0	11
45.0	TO	50.0	10
50.0	TO	75.0	43
75.0	TO	100.0	15
100.0	TO	150.0	32
150.0	TO	200.0	7
200.0	TO	250.0	8
250.0	TO	300.0	3
300.0	TO	400.0	6
400.0	TO	500.0	1
	OVER	500.0	7

TOTAL NUMBER OF ELLIPTICAL AREAS = 618

1843 FEATURES WITH AREAS LESS THAN 4.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	58
10	TO	12	32	TO	39	59
12	TO	14	39	TO	45	101
14	TO	16	45	TO	52	28
16	TO	17	52	TO	55	24
17	TO	20	55	TO	65	55
20	TO	22	65	TO	72	22
22	TO	24	72	TO	78	12
24	TO	26	78	TO	85	15
26	TO	28	85	TO	91	11
28	TO	30	91	TO	98	11
30	TO	32	98	TO	104	8
32	TO	39	104	TO	127	39
39	TO	45	127	TO	147	14
45	TO	55	147	TO	180	25
55	TO	71	180	TO	232	39
71	TO	100	232	TO	328	43
	OVER	100		OVER	328	54

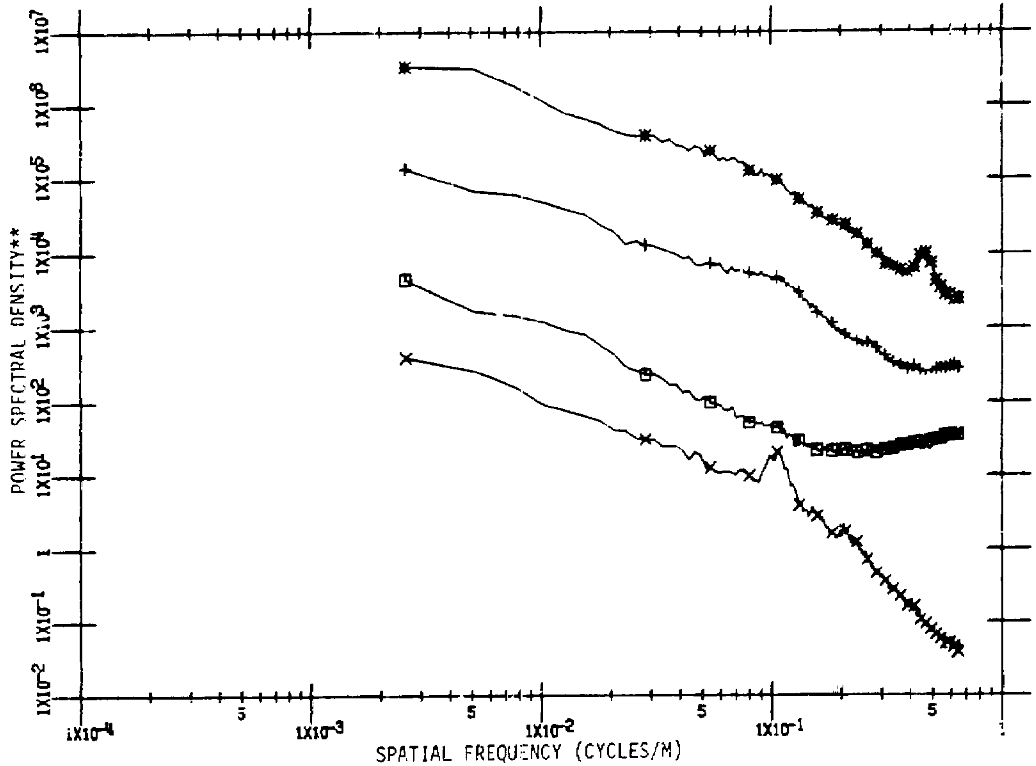
BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	63
1.2	TO	1.3	45
1.3	TO	1.4	63
1.4	TO	1.5	46
1.5	TO	1.6	56
1.6	TO	1.7	51
1.7	TO	1.8	31
1.8	TO	1.9	26
1.9	TO	2.0	32
2.0	TO	2.4	84
2.4	TO	2.6	31
2.6	TO	2.8	24
2.8	TO	3.0	8
3.0	TO	3.5	39
3.5	TO	4.0	10
4.0	TO	4.5	4
	OVER	4.5	5

FLINT, MICHIGAN

Power Spectra

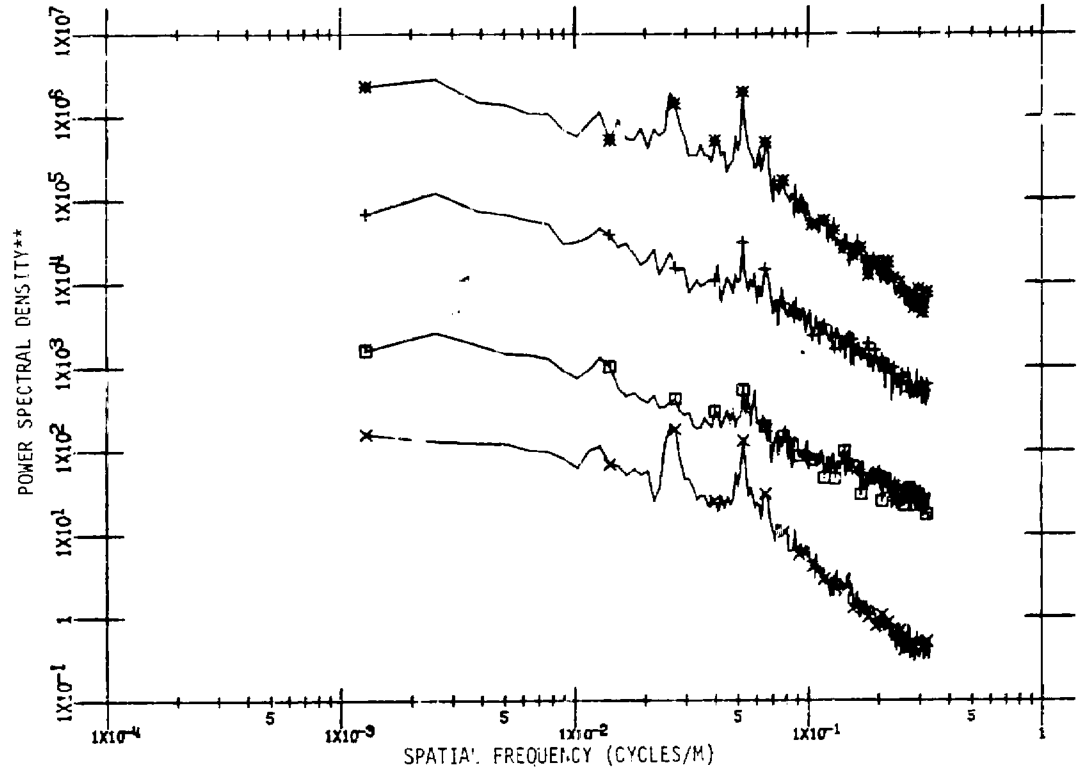
Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
9.3 - 11.7 μm



Area: FLINT-1 CROSS-TRACK Wavelength = 1.0-1.4 (*), 1.5-1.8 (+), 2.0-2.6 (⊡), 9.3-11.7 (X)

POWER SPECTRA

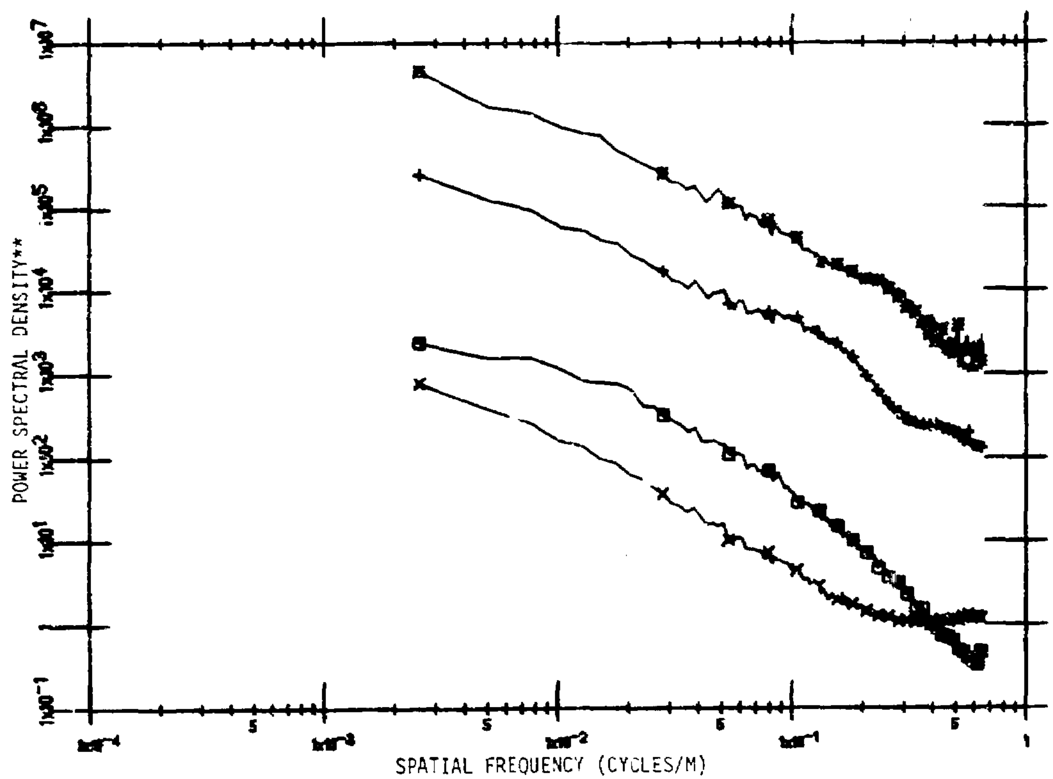
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 μm bands, and $(^\circ K)^2$/cycle/meter for 9.3 to 11.7 μm band.



Area: FLINT-1 IN-TRACK Wavelength = 1.0-1.4 (*), 1.5-1.8 (+), 2.0-2.6 (⊡), 9.3-11.7 (X)

POWER SPECTRA

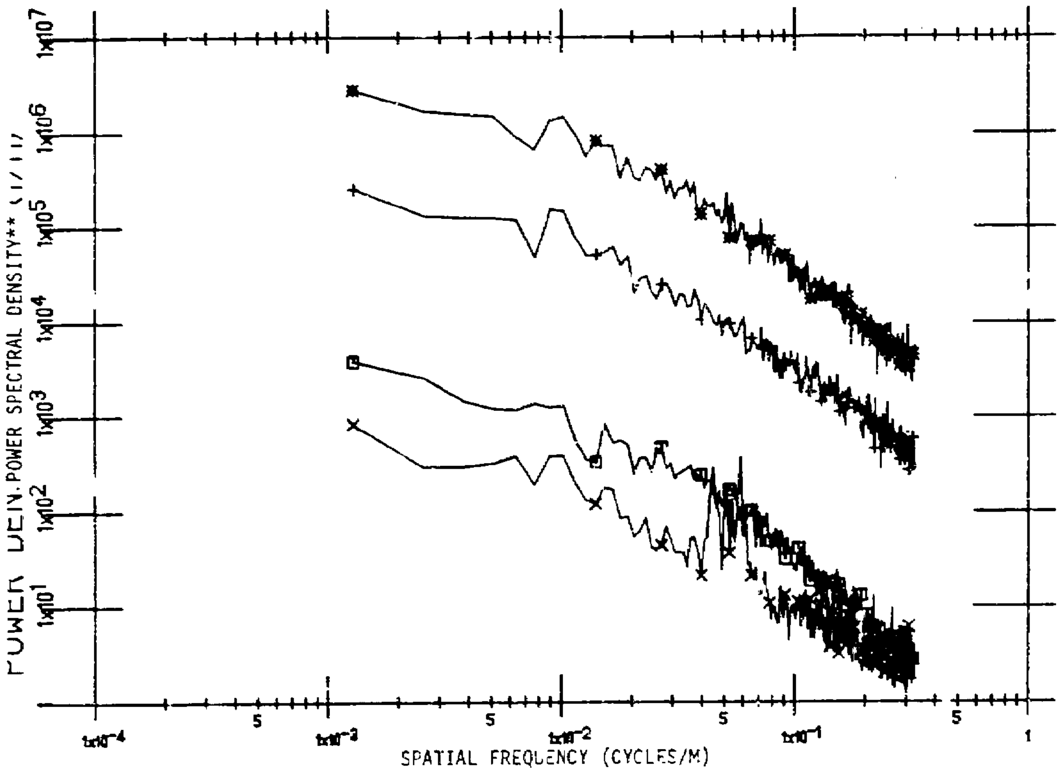
**Power spectral density is $(\mu W \cdot cm^{-2} \cdot sr^{-1} \cdot \mu m^{-1})^2$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 μm bands, and $(°K)^2$/cycle/meter for 9.3 to 11.7 μm band.



Area: FLINT-2 CROSS-TRACK Wavelength = 1.0-1.4 (*), 1.5-1.8 (+), 2.0-2.6 (⊡), 9.3-11.7 (X)

POWER SPECTRA

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}um^{-1})^2$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 um bands, and $(K)^2$/cycle/meter for 9.3 to 11.7 um band.



Area: FLINT-2 IN-TRACK Wavelength = 1.0-1.4 (*), 1.5-1.8 (+), 2.0-2.6 (⊡), 9.3-11.7 (X)

POWER SPECTRA

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^{-2}$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 μm bands, and $(°K)^2$/cycle/meter for 9.3 to 11.7 μm band.

MICHIGAN WINTER SCENES*

CITY

CONIFERS

FARMLAND

LAND AND WATER

Pertinent Scene and Flight Information

(Dates of Flights: 3,4 April 1979)

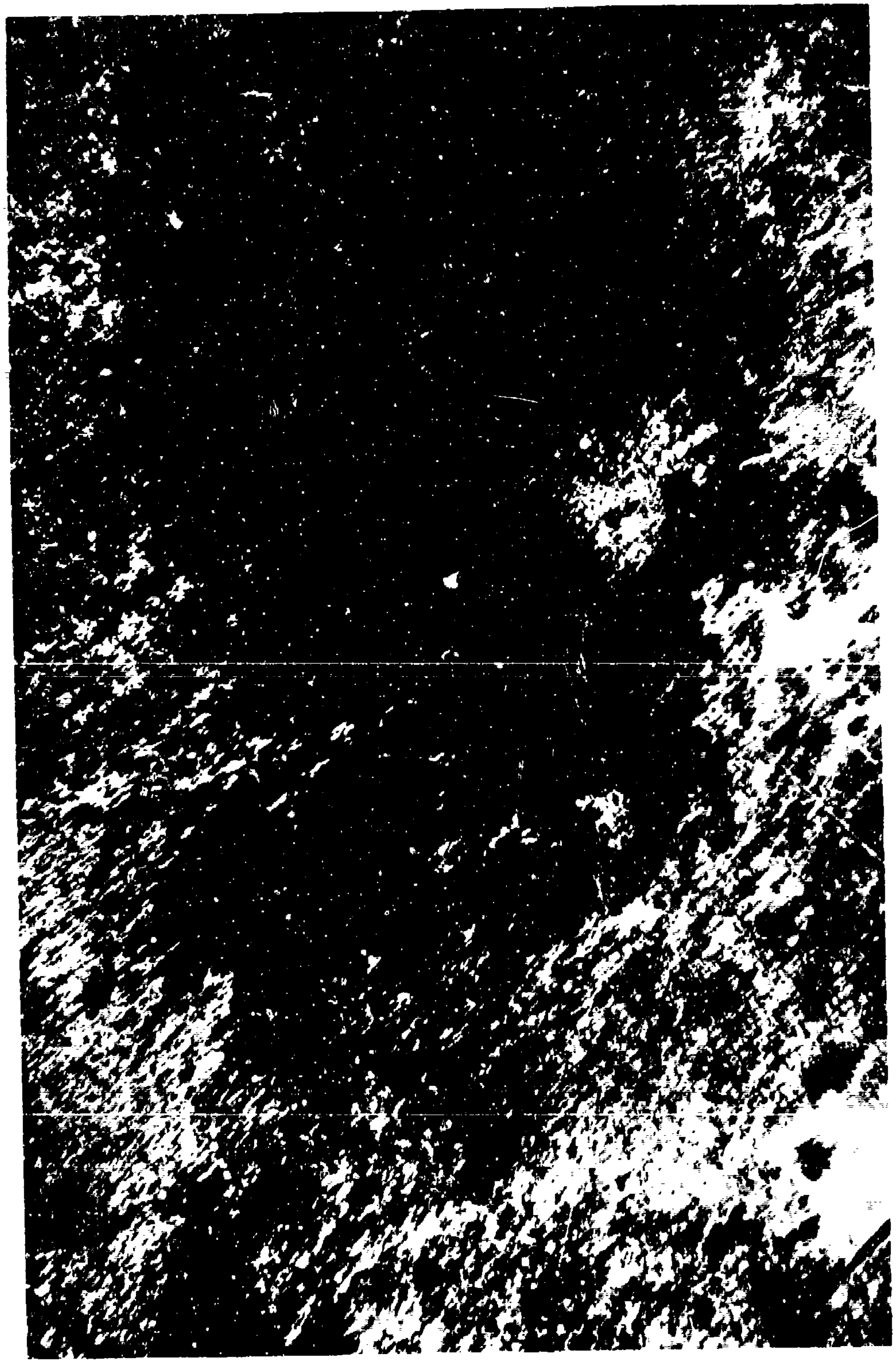
*For specific discussions of these and associated data for this scenery, refer to Reference 6.

PERTINENT INFORMATION ABOUT DIURNAL MICHIGAN WINTER SCENE DATA

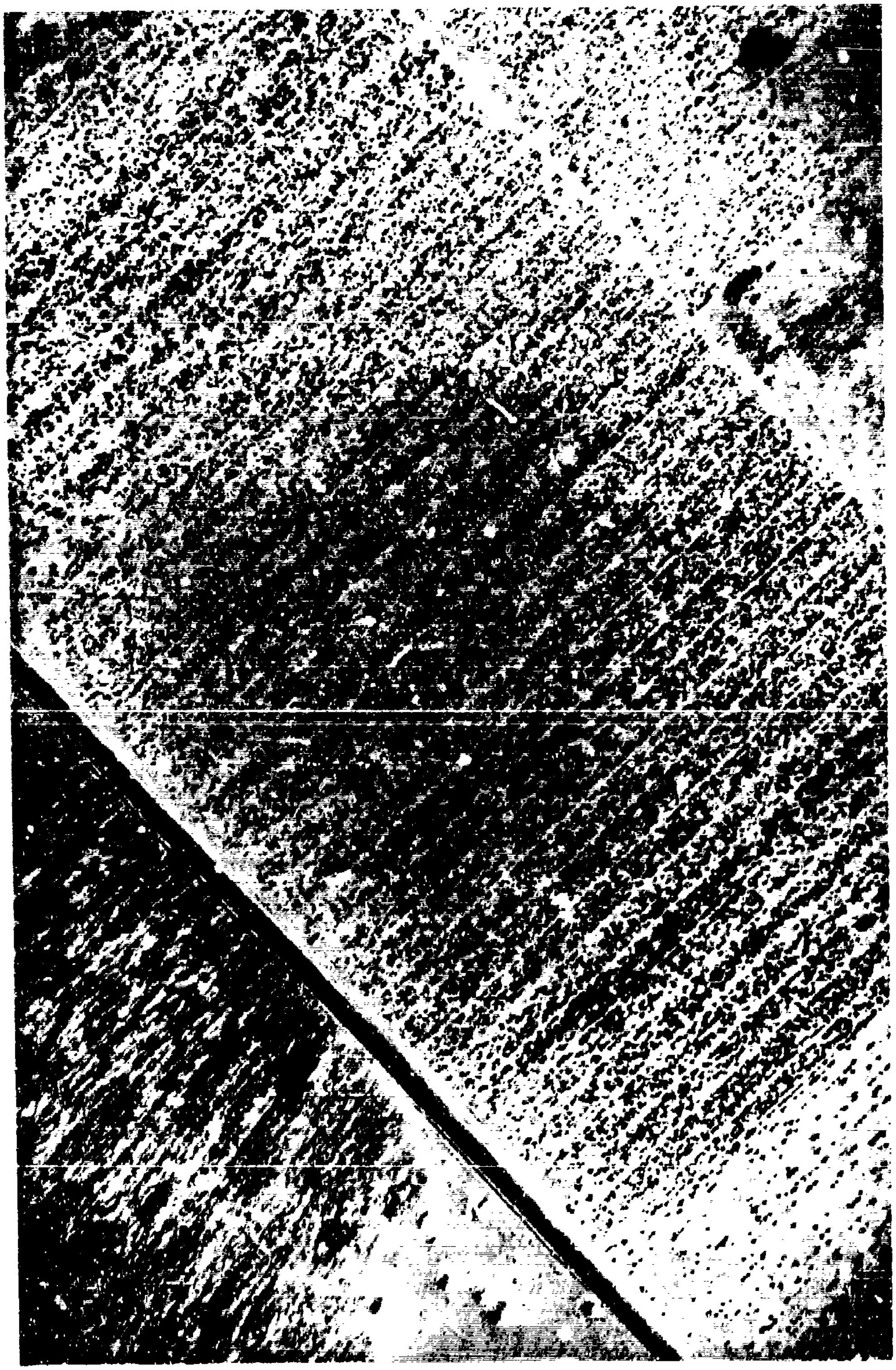
	Pre-Dawn	Noon	Sunset	Midnight
Wavelength Bands:	4.5-5.5 μm, 9.0-11.4 μm	3.5-3.9 μm, 4.5-5.5 μm, 9.0-11.4 μm	4.5-5.5 μm, 9.0-11.4 μm	4.5-5.5 μm, 9.0-11.4 μm
IFOV:	2.5 mrad	2.5 mrad	2.5 mrad	2.5 mrad
Altitude: 90° Depression	1750 ft	1750 ft	1750 ft	1750 ft
Altitude: 35° Depression	1000 ft	1000 ft	1000 ft	1000 ft
Time:	0535-0605 hrs	1230-1305 hrs	1900-1930 hrs	0030-0120 hrs
Flight Direction:	NNW	NNW	NNW	NNW
Ground Speed:	202 $ft\text{-}sec^{-1}$	202 $ft\text{-}sec^{-1}$	202 $ft\text{-}sec^{-1}$	202 $ft\text{-}sec^{-1}$
Area Covered (Approx.):	1650 ft long 2800 ft wide (1750 ft wide)*	1650 ft long 2800 ft wide (1750 ft wide)*	1650 ft long 2800 ft wide (1750 ft wide)*	1650 ft long 2800 ft wide (1750 ft wide)*
Type of Area Analyzed:	4 types: city; land-to-water transition; conifers; farmland	4 types: city; land-to-water transition; conifers; farmland	4 types: city; land-to-water transition; conifers; farmland	4 types: city; land-to-water transition; conifers; farmland
Meteorology:	Snow covered ground; air temp=-2°C; cloud cover=95%	Snow covered ground; air temp=5°C; cloud cover: clear	Snow covered ground, air temp=4°C, cloud cover=15%	Snow covered ground; air temp=-2°C; cloud cover=60% - 95%

*In this table, the asterisk applies to the width of the scene for which the statistics are calculated. This is about 63% of the imagery width, centered in the image.

AERIAL PHOTOGRAPH - CITY

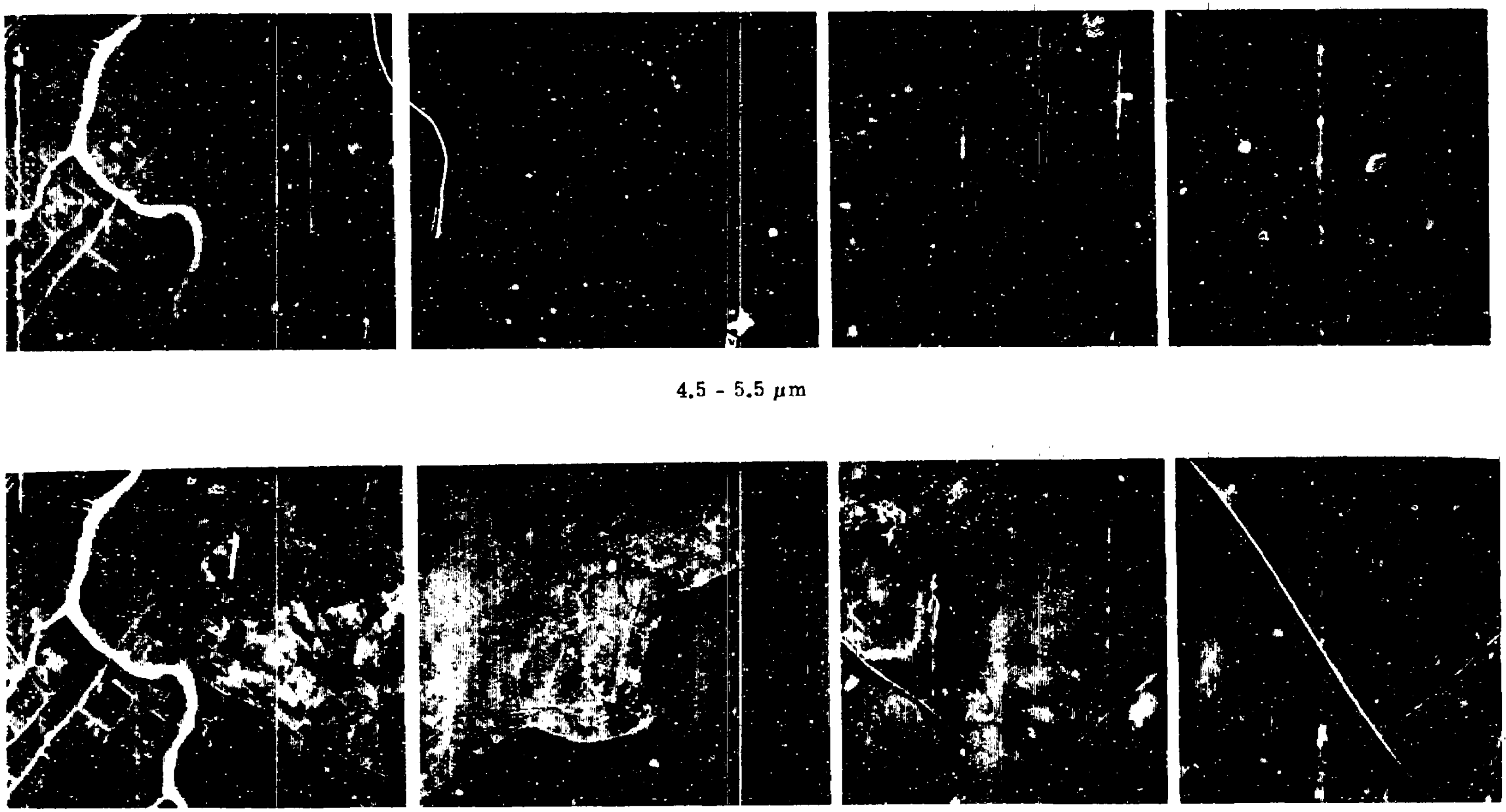


AERIAL PHOTOGRAPH - CONIFERS



AERIAL PHOTOGRAPH - FARMLAND

AERIAL PHOTOGRAPH - LAND & WATER

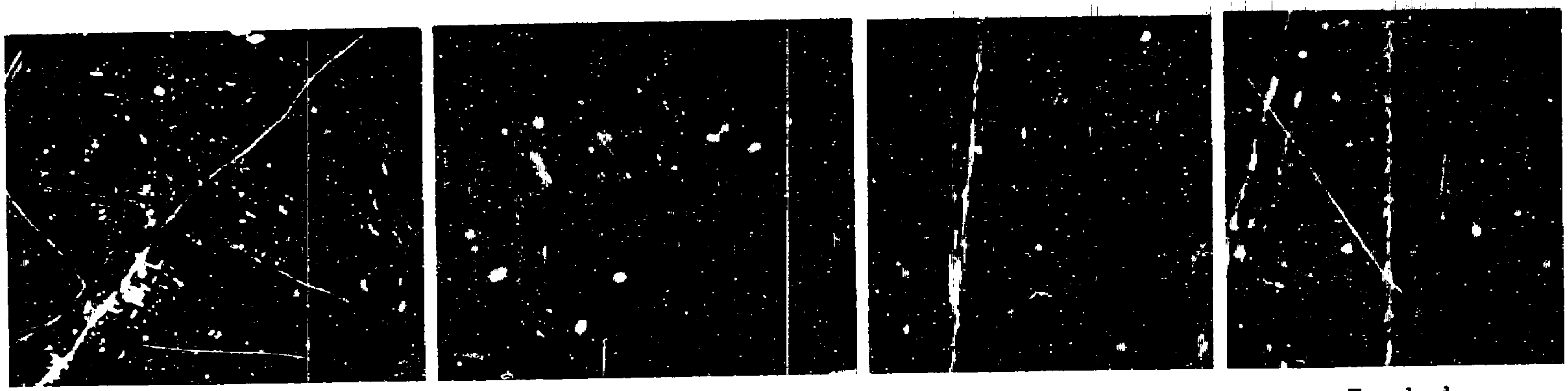


4.5 - 5.5 μm

City Land & Water Conifers Farmland

9.0 - 11.4 μm

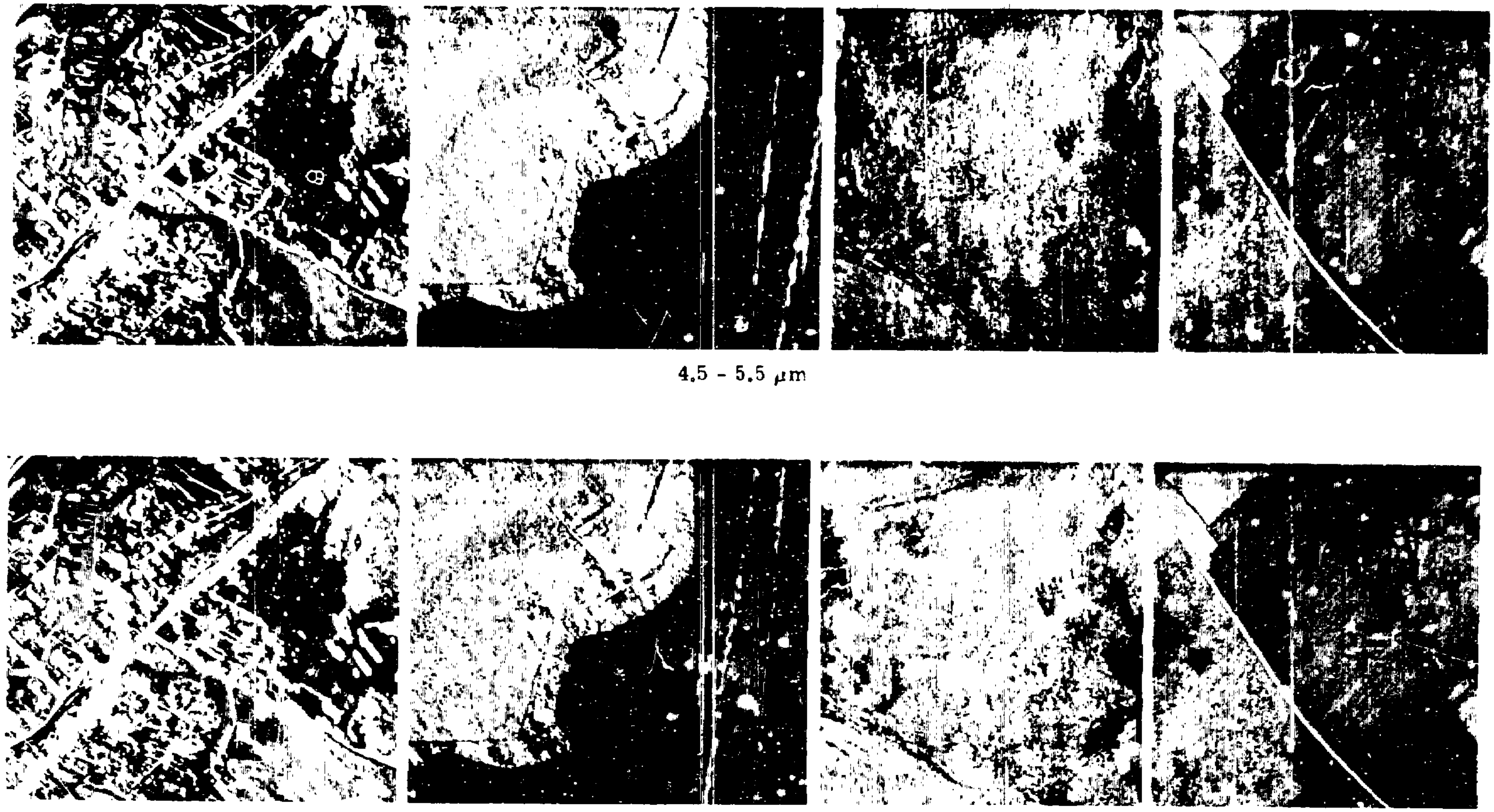
MICHIGAN WINTER SCENE IMAGERY - PRE-DAWN (90^{o} Depression)



City Land & Water Conifers Far mland

3.5 - 3.9 μm

MICHIGAN WINTER SCENE IMAGERY - NOON (90^{o} Depression)

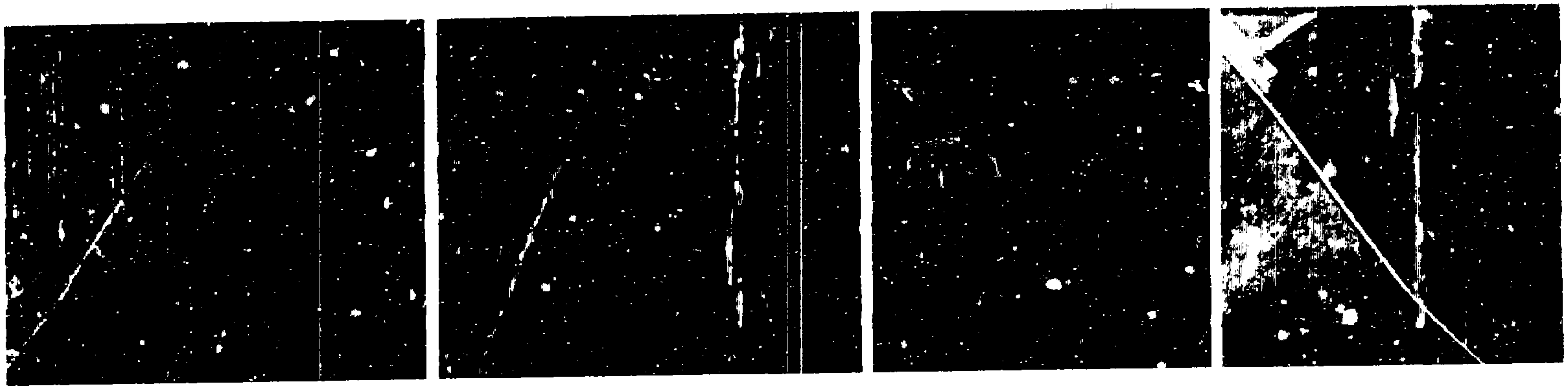


4.5 - 5.5 μm

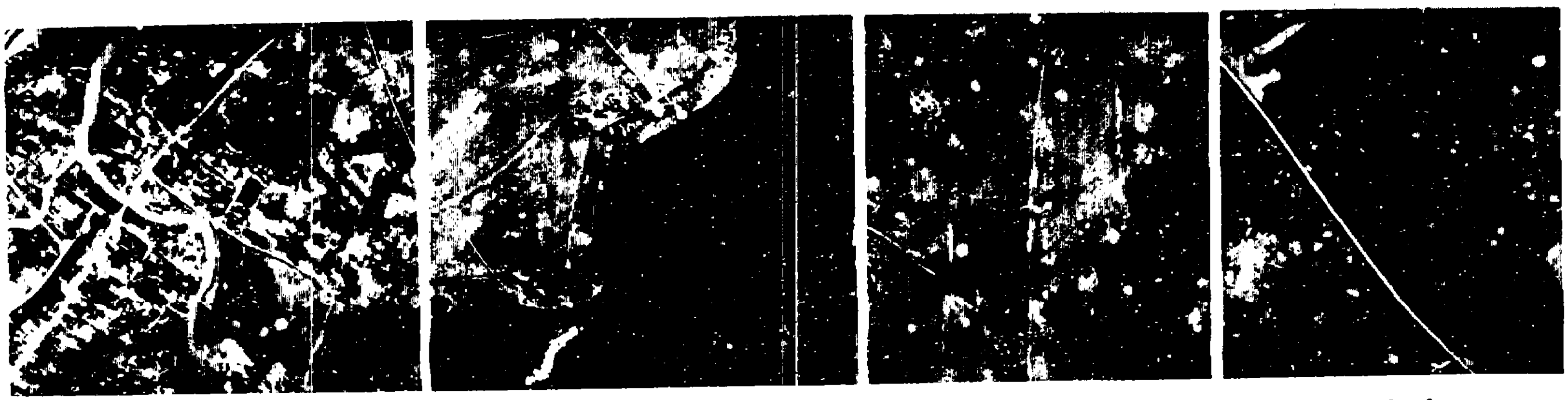
City | Land & Water | Conifers | Farmland

9.0 - 11.4 μm

MICHIGAN WINTEP SCENE IMAGERY - NOON (90° Depression)



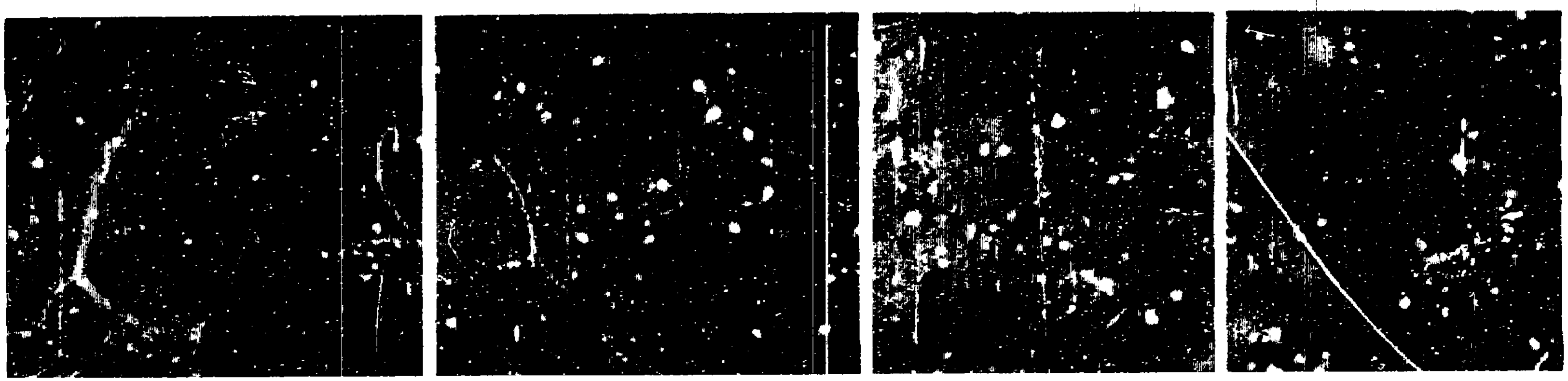
4.5 - 5.5 μm



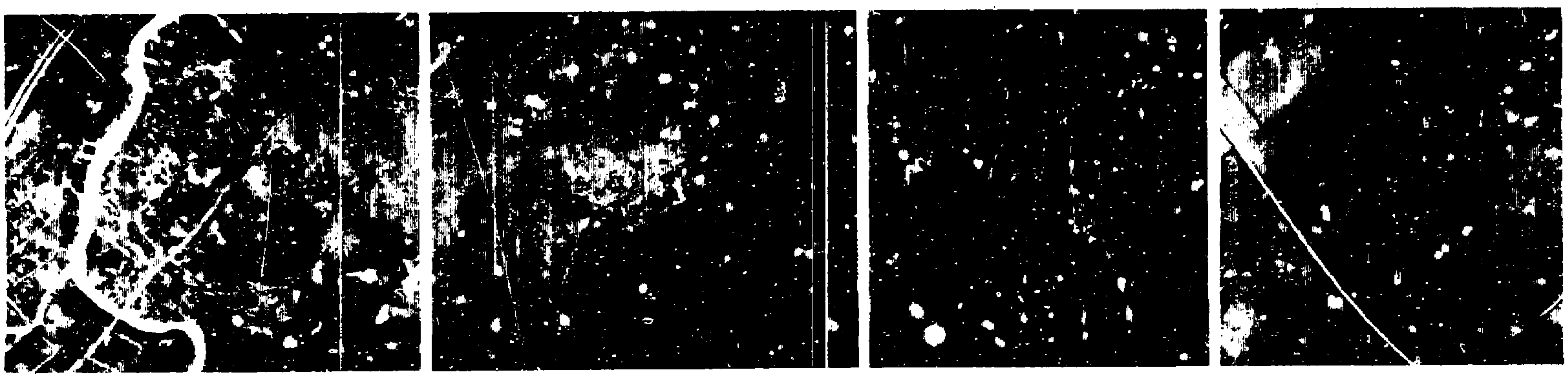
City | Land & Water | Conifers | Farmland

9.0 - 11.4 μm

MICHIGAN WINTER SCENE IMAGERY - SUNSET (90^{o} Depression)



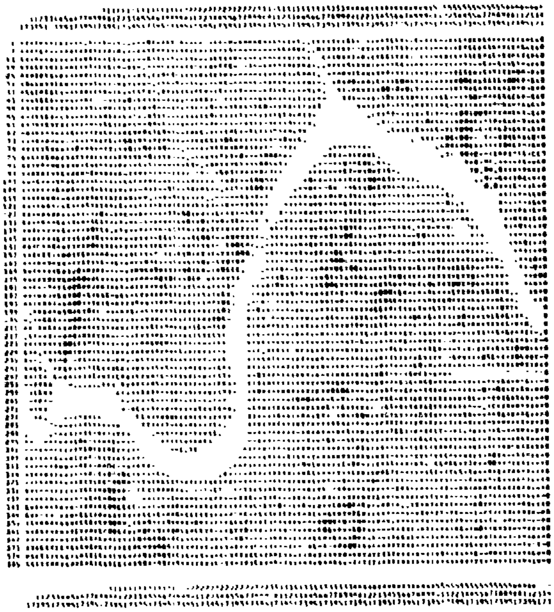
4.5 - 5.5 μm



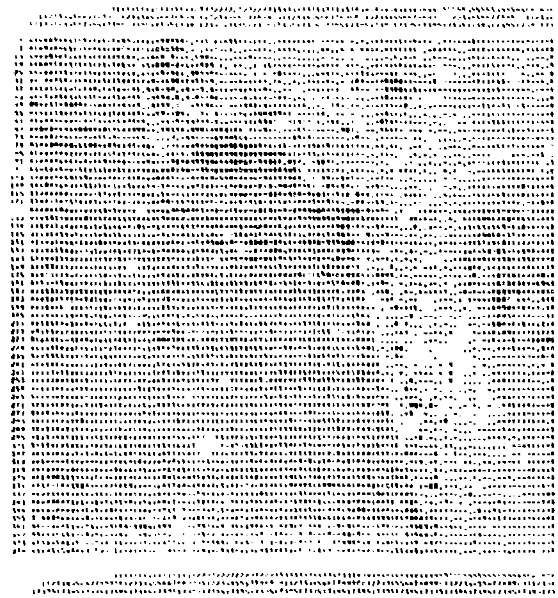
City — Land & Water — Conifers — Farmland

9.0 - 11.4 μm

MICHIGAN WINTER SCENE IMAGERY - MIDNIGHT (90^{o} Depression)



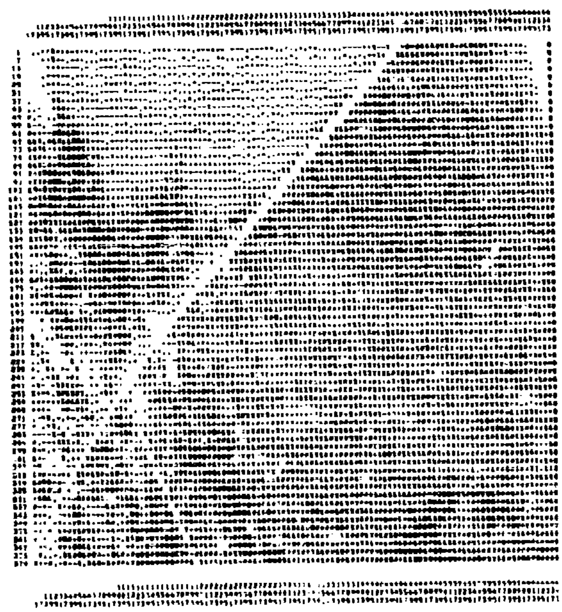
CITY



LAND & WATER

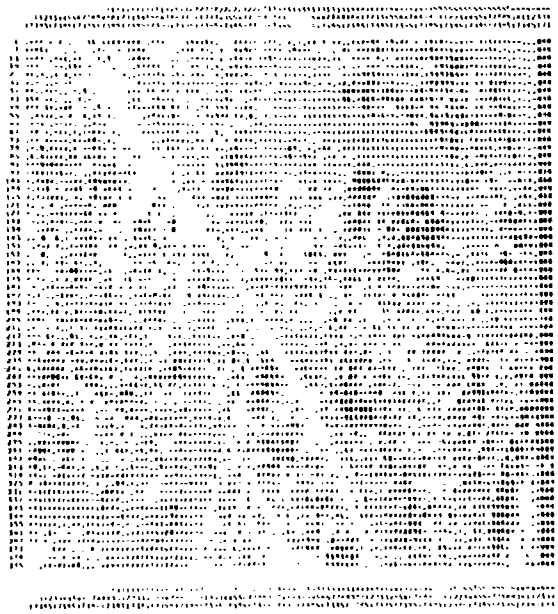
(All scenes are 2825 ft wide by 1650 ft long.)

CONIFERS



FARMLAND

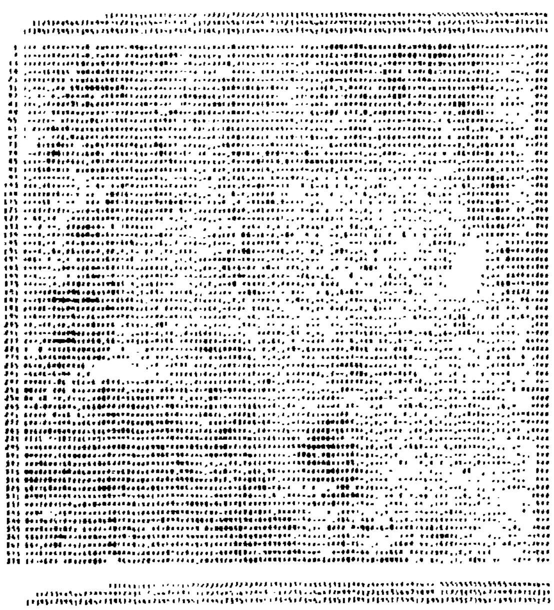
FIGURE 9. MICHIGAN WINTER SCENE GREYMAPS - PRE-DAWN



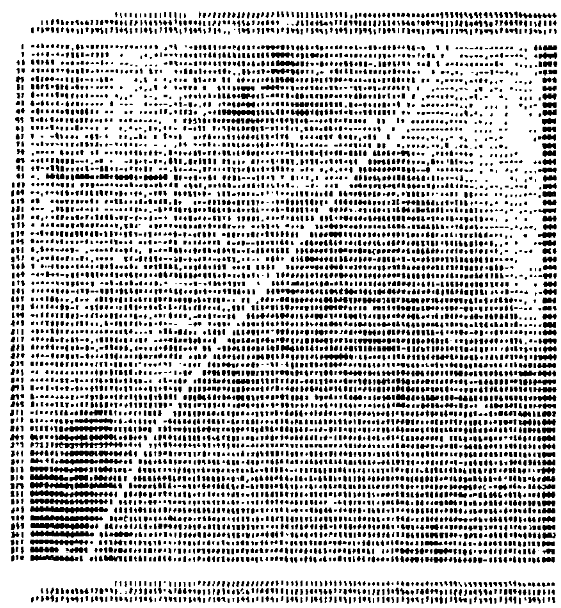
CITY

LAND & WATER

(All scenes are 2825 ft wide by 1650 ft long.)

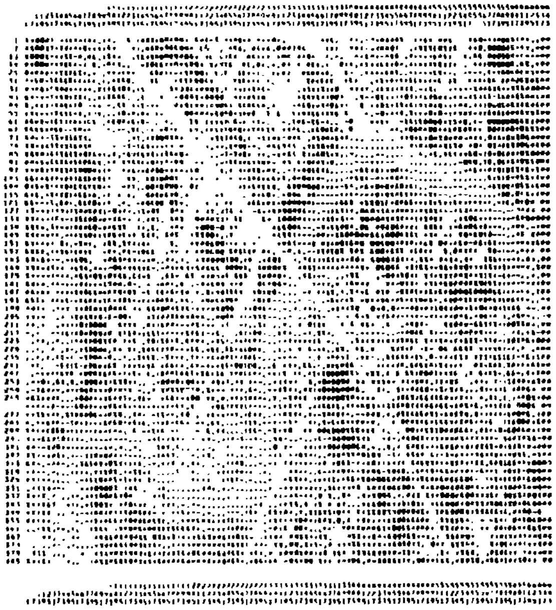


CONIFERS

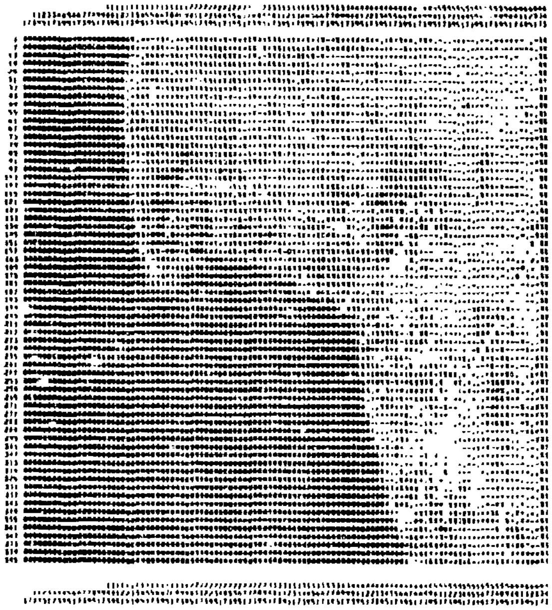


FARMLAND

FIGURE 10. MICHIGAN WINTER SCENE GREYMAPS - NOON

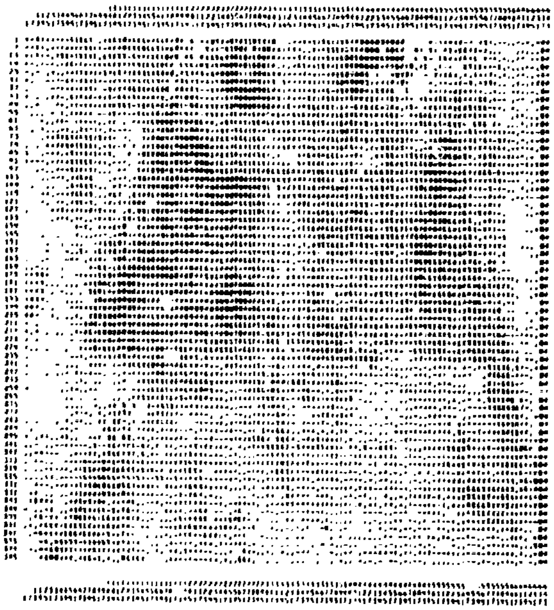


CITY

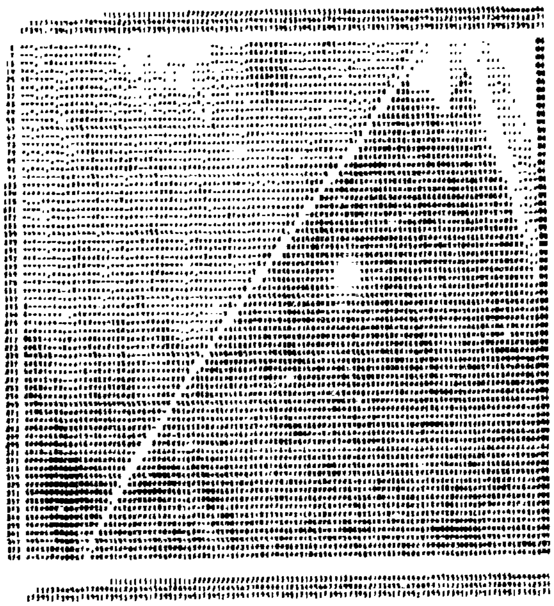


LAND & WATER

(All scenes are 2825 ft wide by 1650 ft long.)

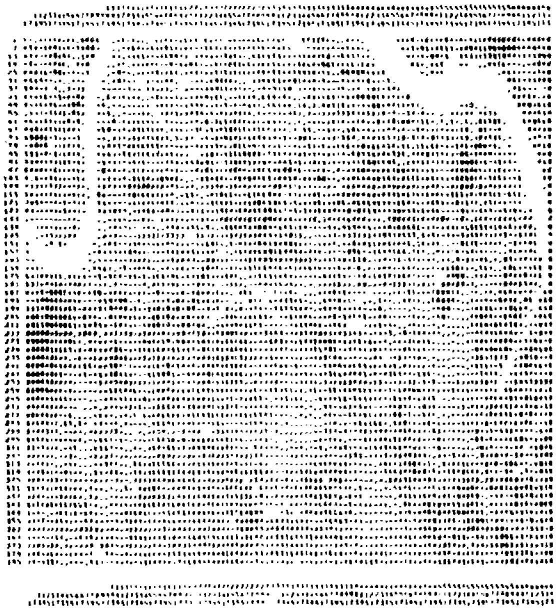


CONIFERS

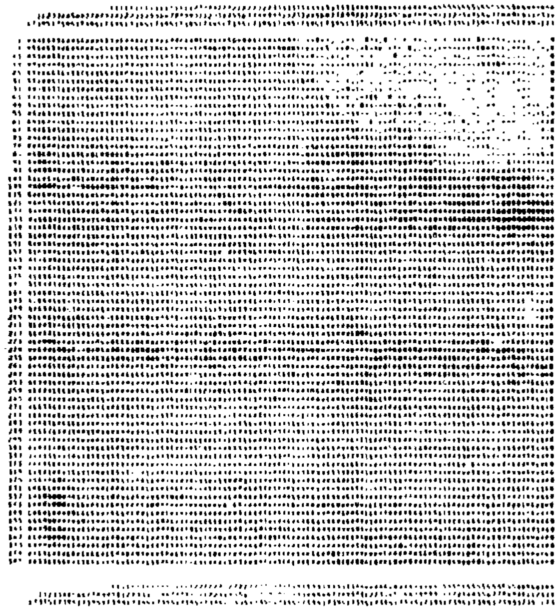


FARMLAND

FIGURE 11. MICHIGAN WINTER SCENE GREYMAPS - SUNSET



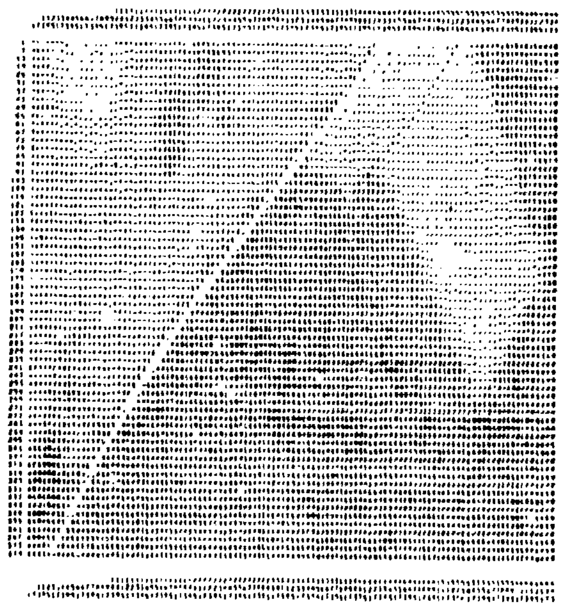
CITY



LAND & WATER

(All scenes are 2825 ft wide by 1650 ft long.)

CONIFERS



FARMLAND

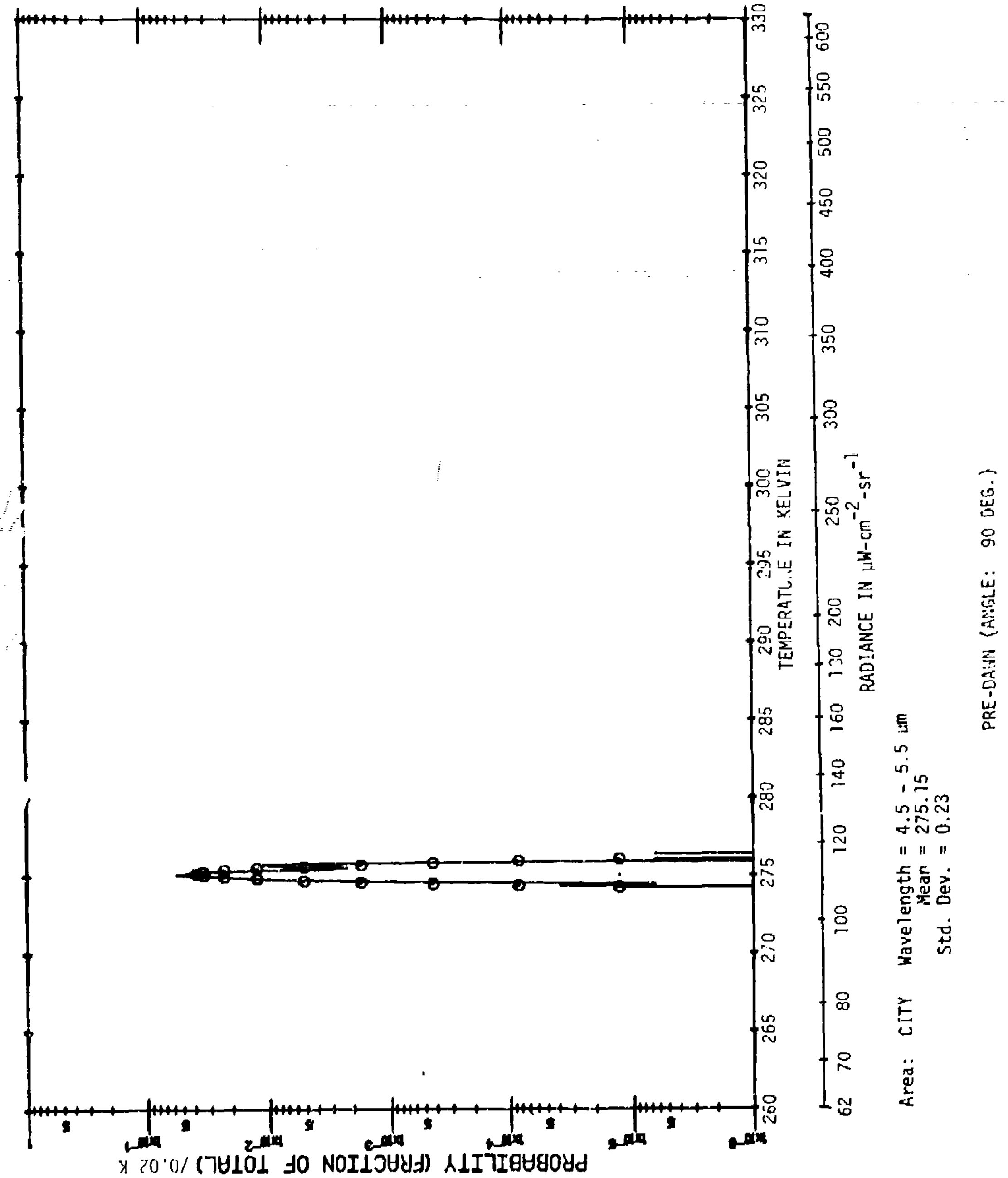
FIGURE 12. MICHIGAN WINTER SCENE GREYMAPS - MIDNIGHT

MICHIGAN WINTER SCENE - CITY

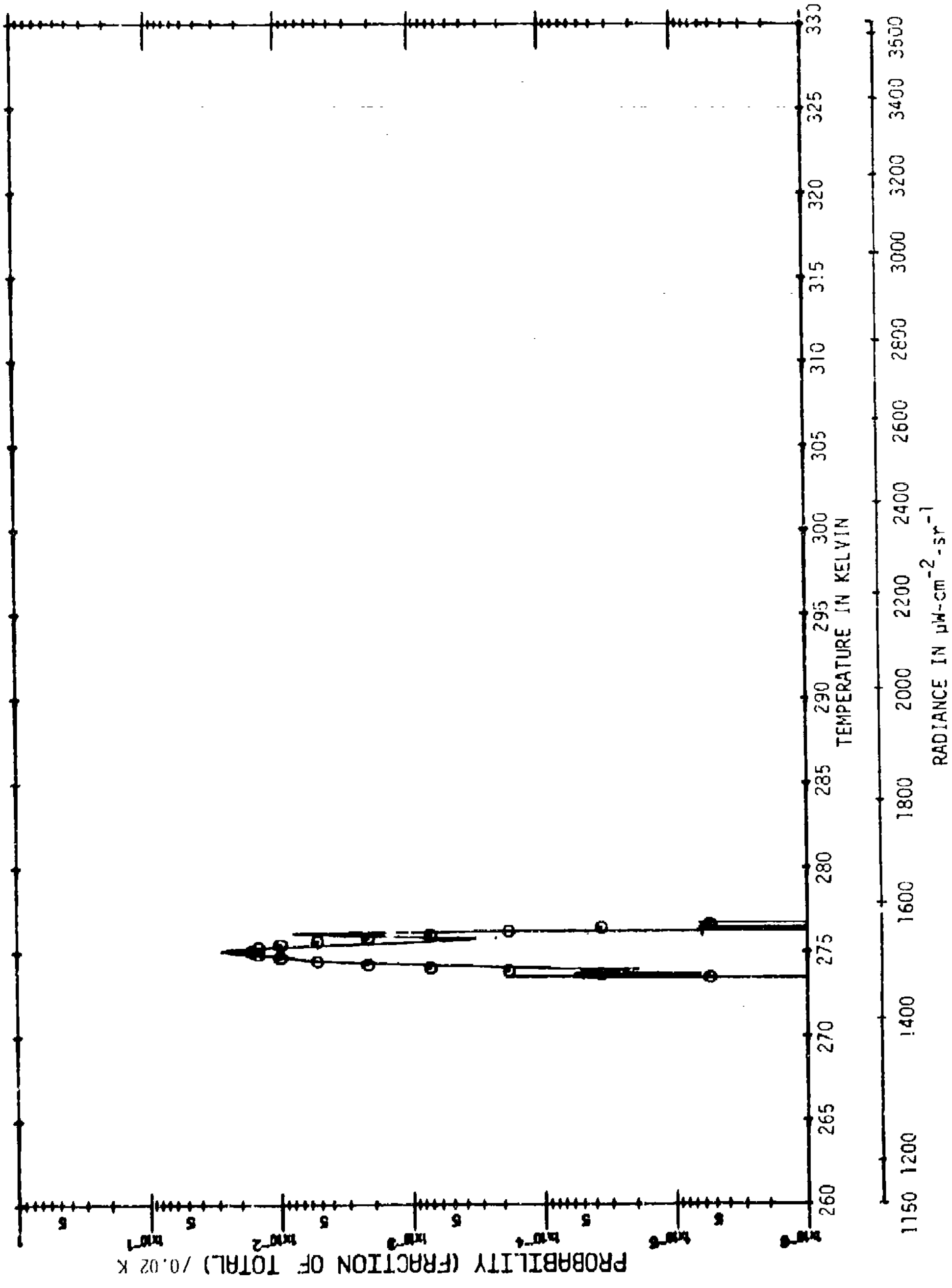
Histograms*

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.

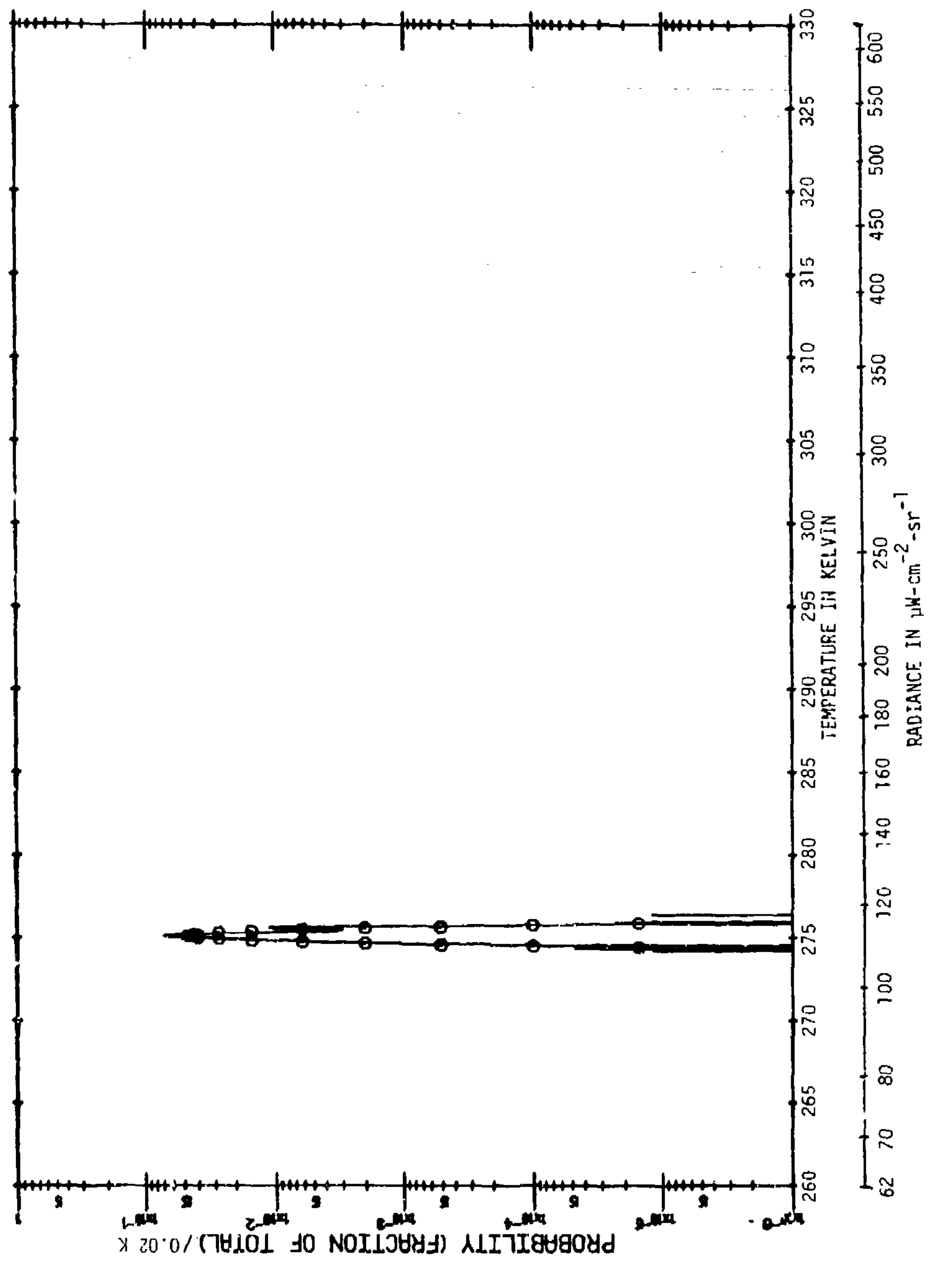


260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
TEMPERATURE IN KELVIN
62 70 80 100 120 140 160 180 200 250 300 350 400 450 500 550 600
RADIANCE IN $\mu W\text{-}cm^{-2}\text{-}sr^{-1}$
PROBABILITY (FRACTION OF TOTAL)/0.02 K
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.15
Std. Dev. = 0.23
PRE-DAWN (ANGLE: 90 DEG.)



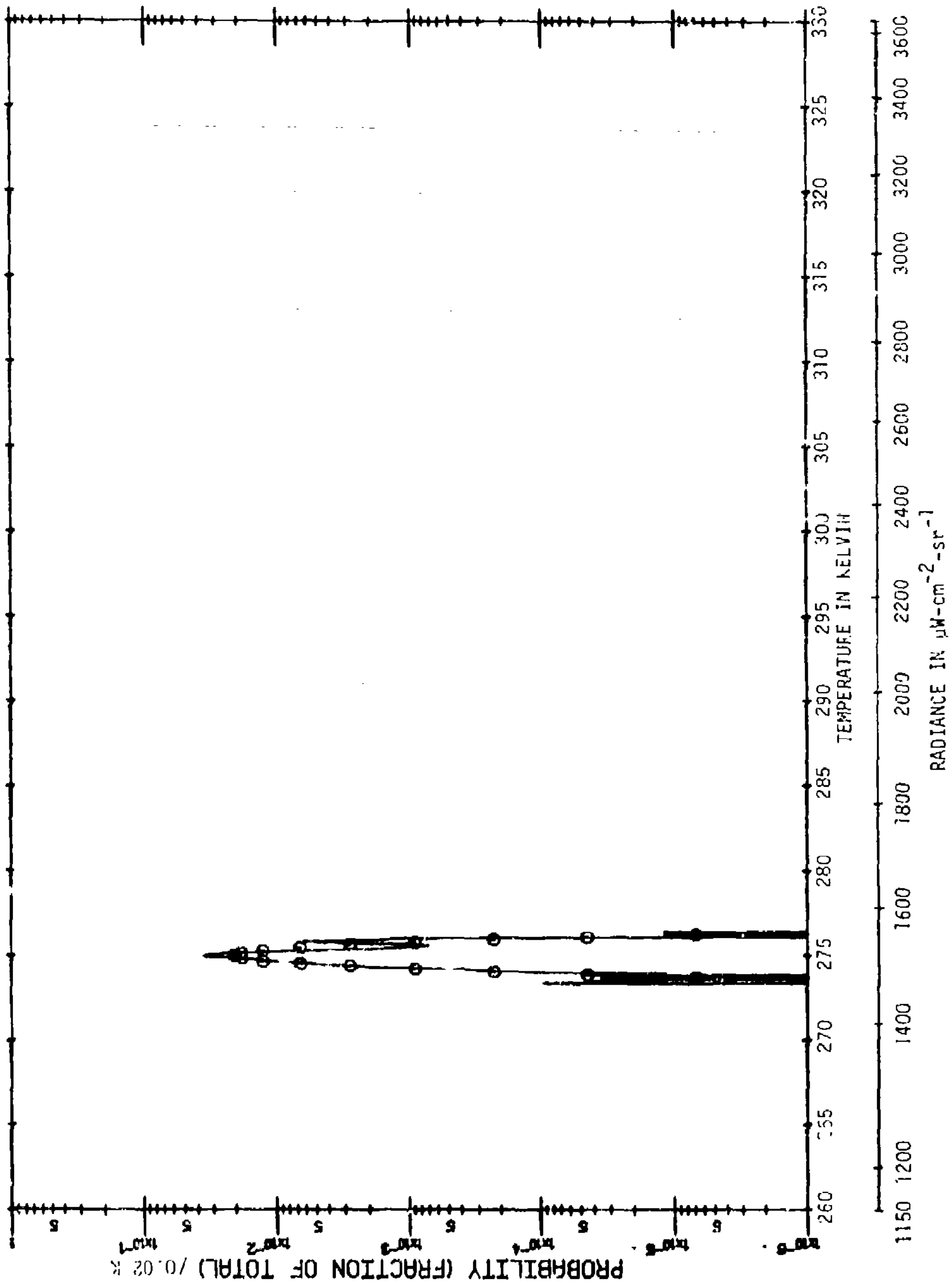
Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 275.07
Std. Dev. = 0.39

PRE-DAWN (ANGLE 90 DEG.)



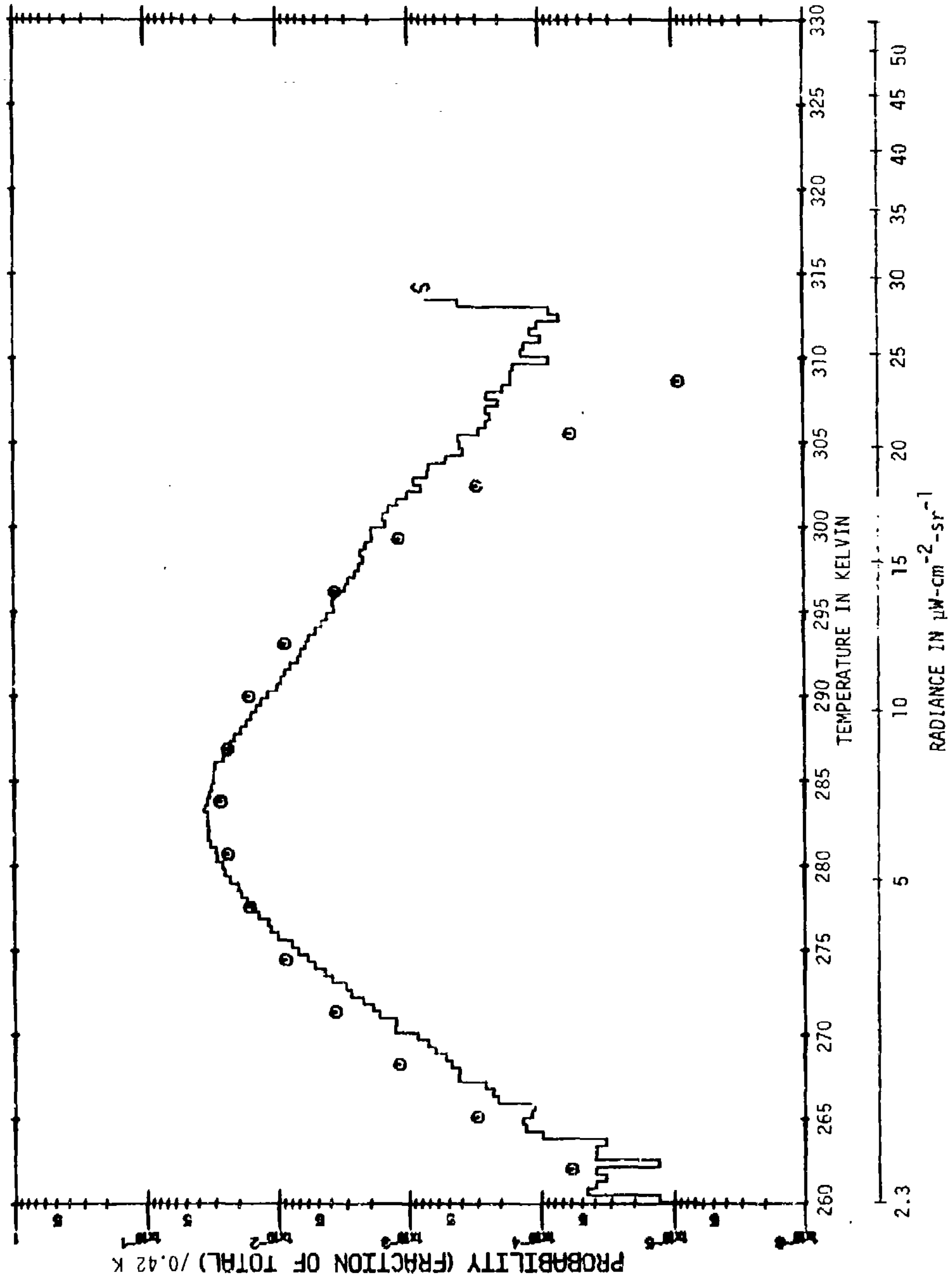
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.13
Std. Dev. = 0.18

PRE-DAWN (ANGLE: 35 DEG.)



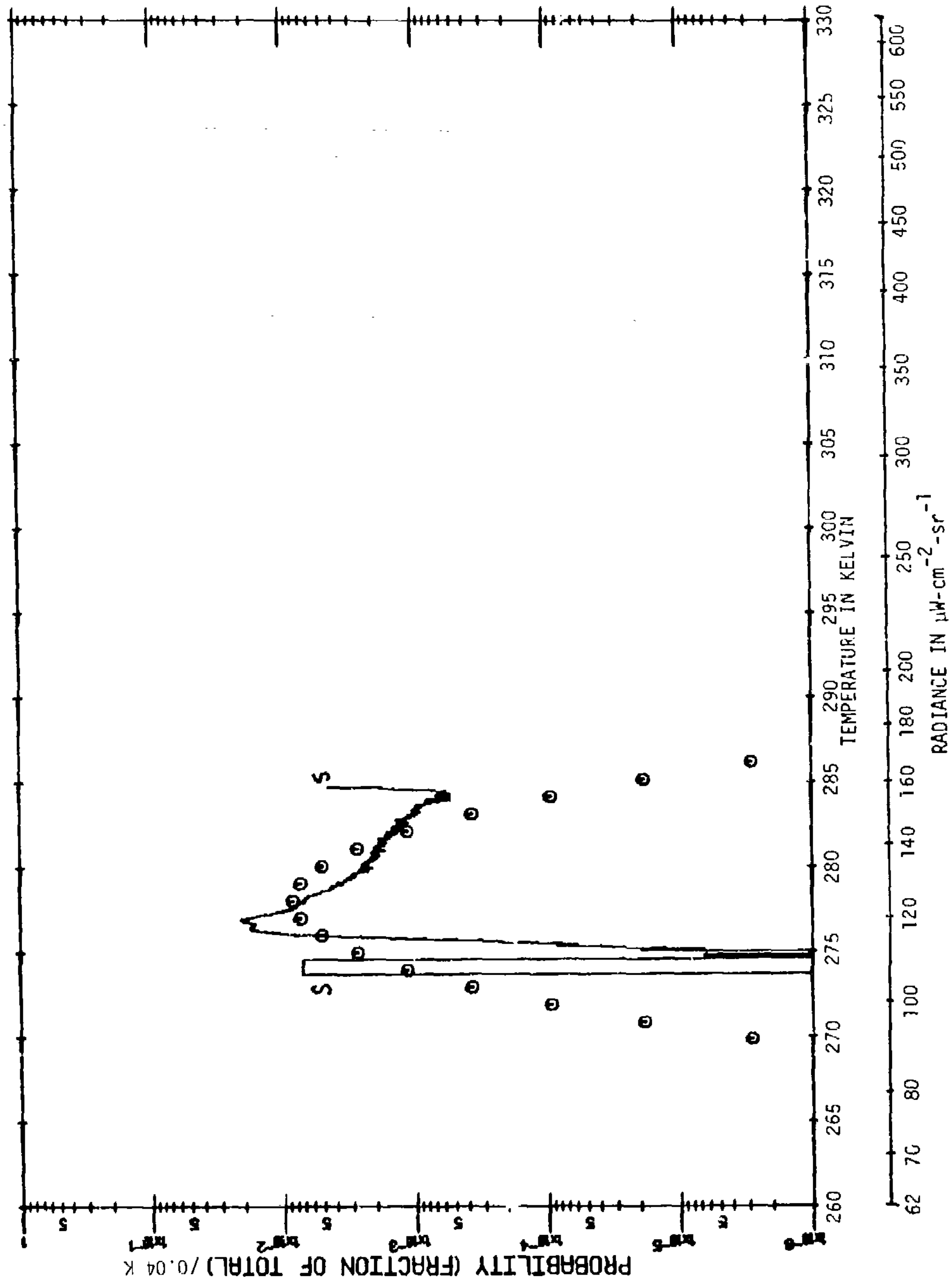
Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 274.99
Std. Dev. = 0.31

PRE-DAWN (ANGLE: 35 DEG.)



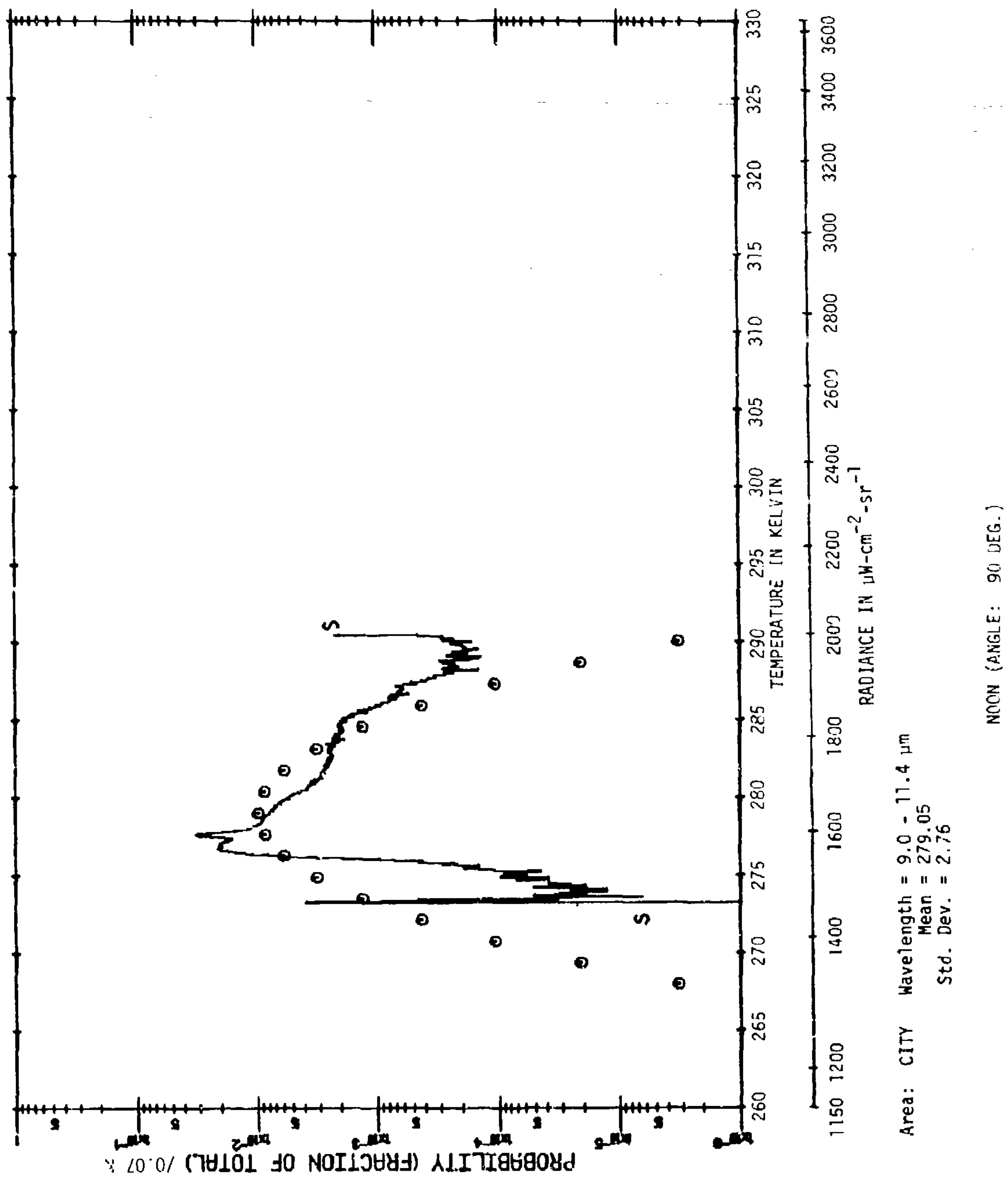
Area: CITY Wavelength = 3.5 - 3.9 µm
Mean = 283.80
Std. Dev. = 6.21

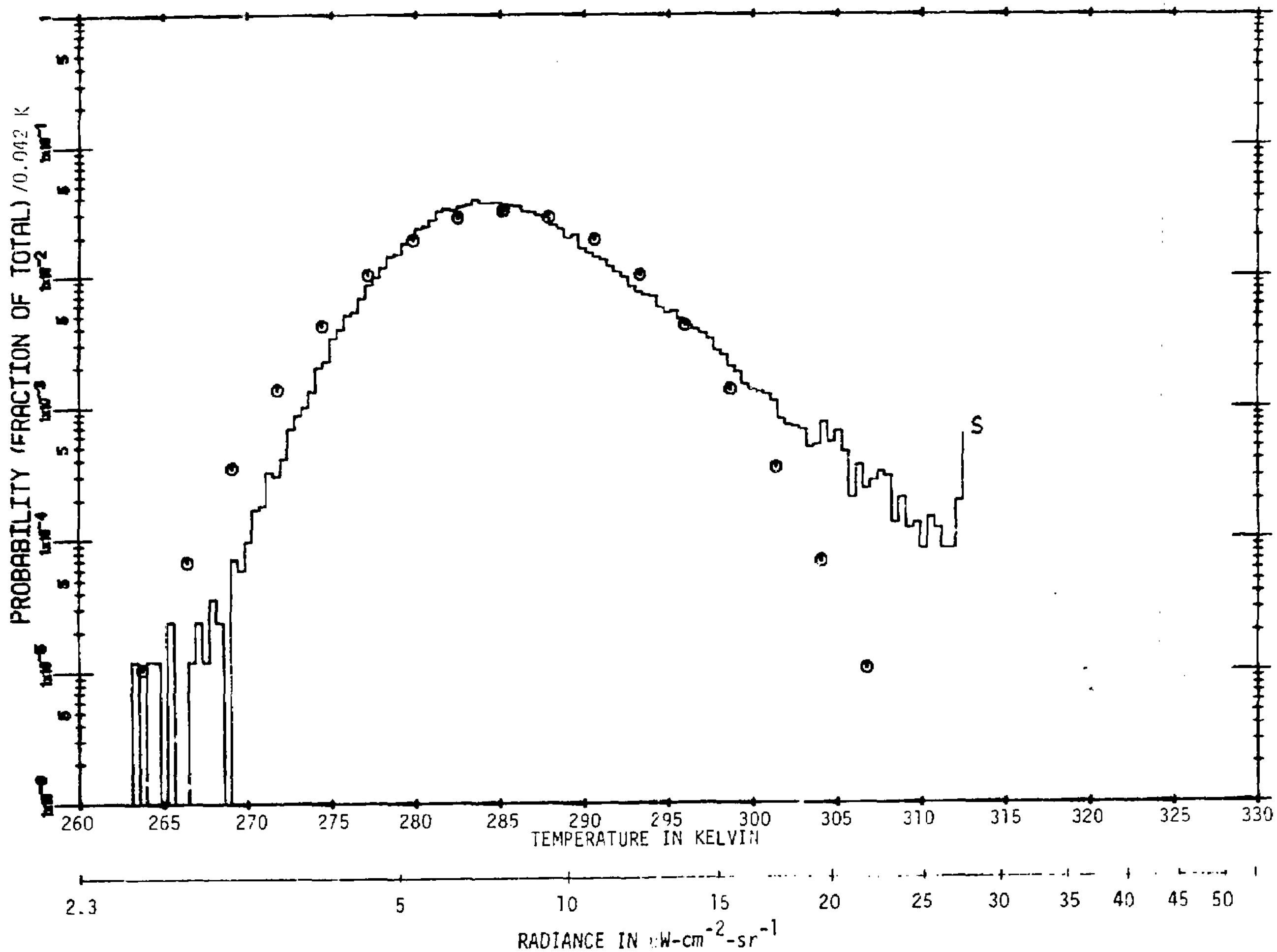
NOON (ANGLE: 90 DEG.)



Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 278.05
Std. Dev. = 2.04

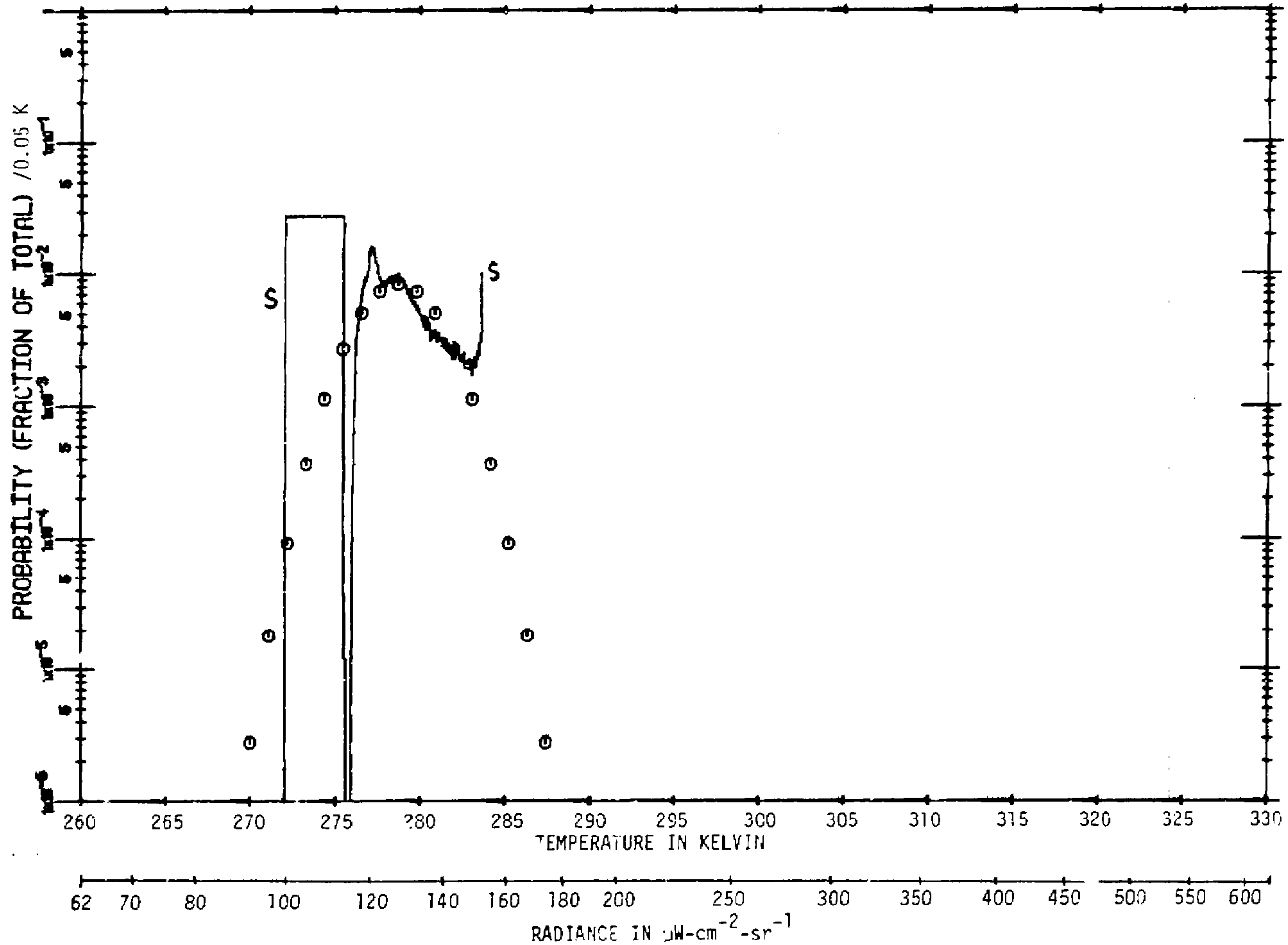
NOON (ANGLE: 90 DEG.)


PROBABILITY (FRACTION OF TOTAL) /0.07 K
TEMPERATURE IN KELVIN
RADIANCE IN µW-cm^{-2}-sr^{-1}
Area: CITY
Wavelength = 9.0 - 11.4 µm
Mean = 279.05
Std. Dev. = 2.76
NOON (ANGLE: 90 DEG.)



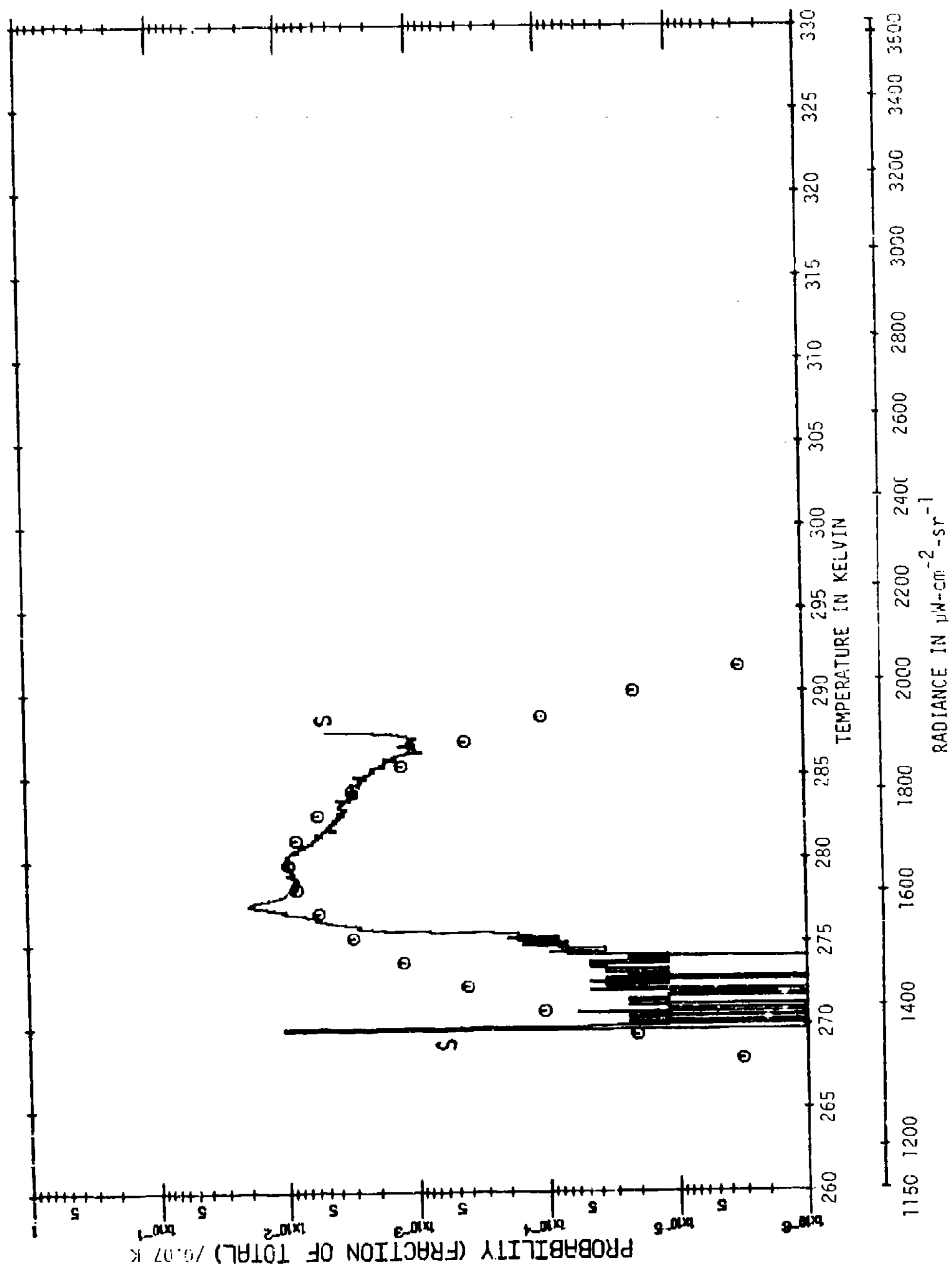
Area: CITY Wavelength = 3.5 - 3.9 μm
Mean = 285.27
Std. Dev. = 5.38

NOON (ANGLE: 35 DEG.)



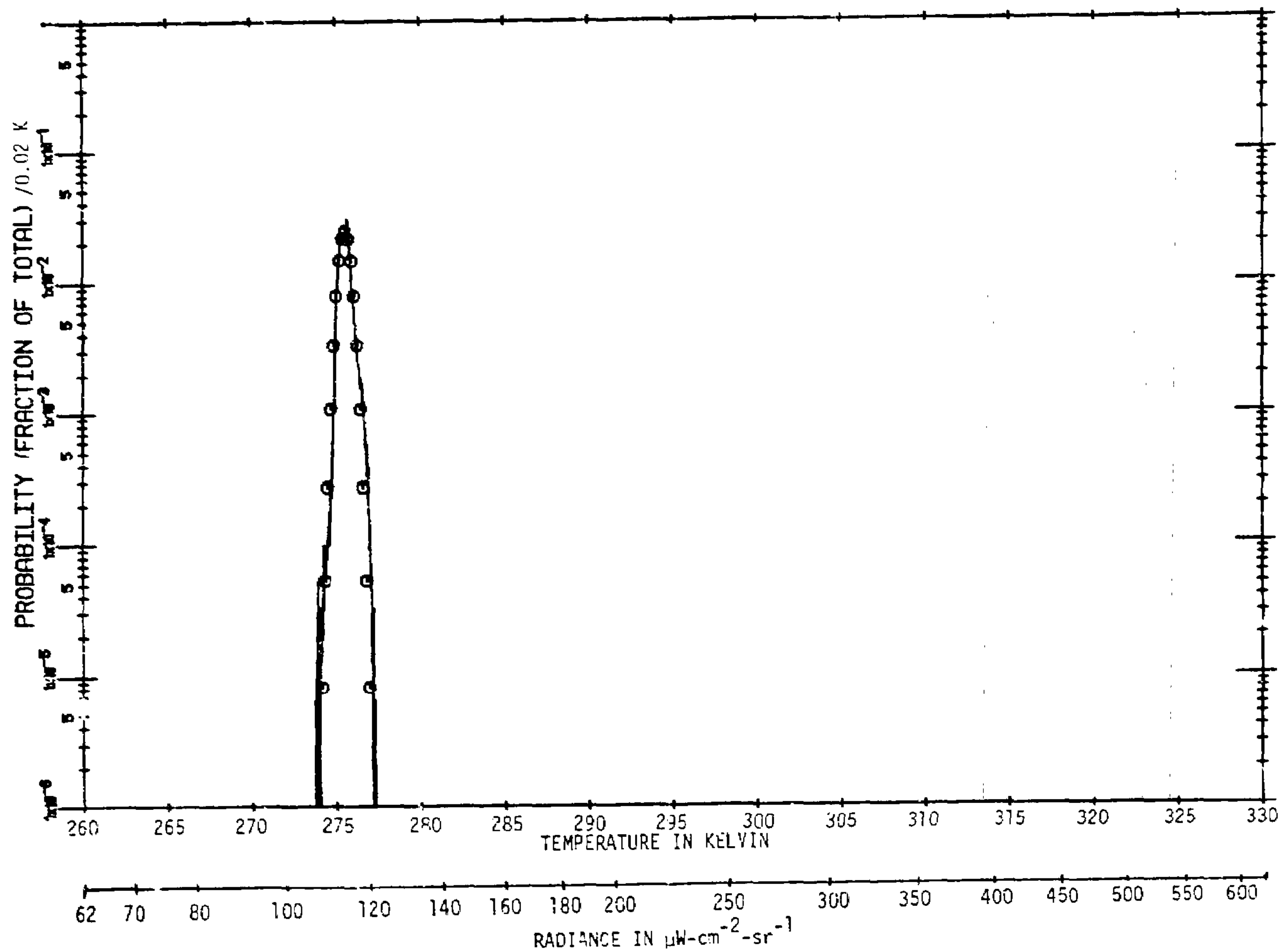
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 273.70
Std. Dev. = 2.18

NOON (ANGLE: 35 DEG.)



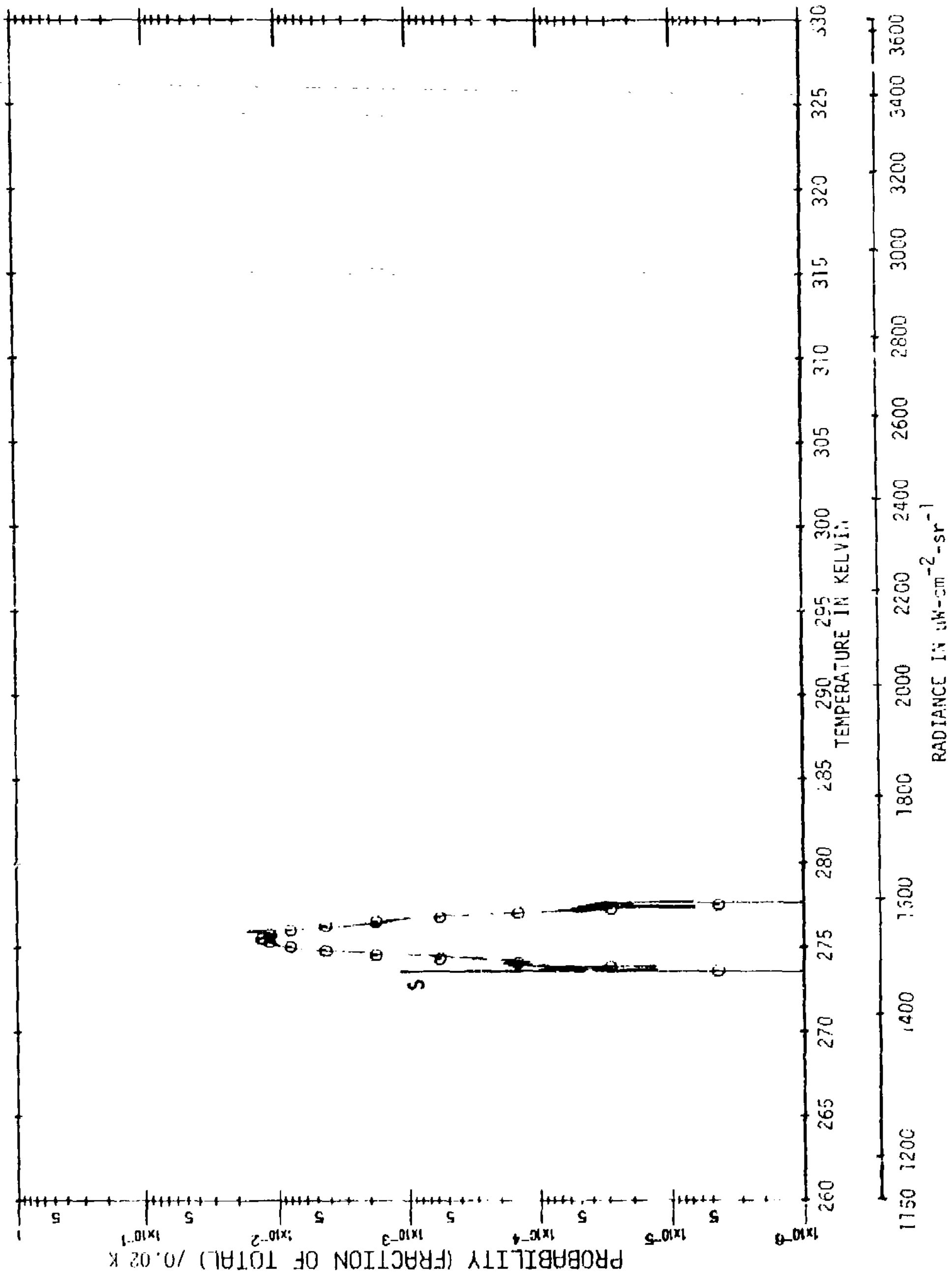
Area: CITY Wavelength = 9.0 - 11.4 µm
Mean = 279.74
Std. Dev. = 2.94

NOON (ANGLE: 35 DEG.)



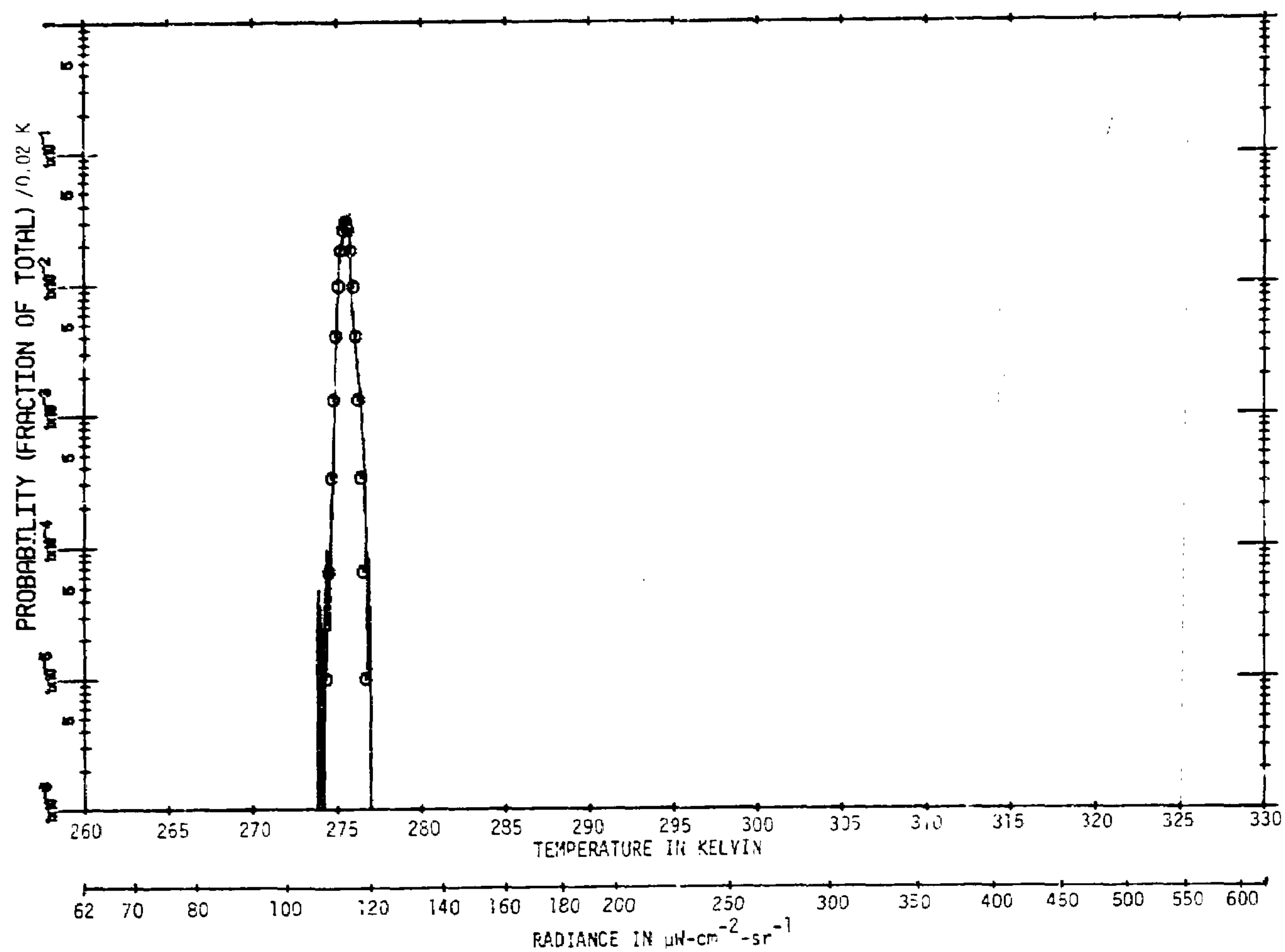
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.60
Std. Dev. = 0.35

SUNSET (ANGLE: 90 DEG.)



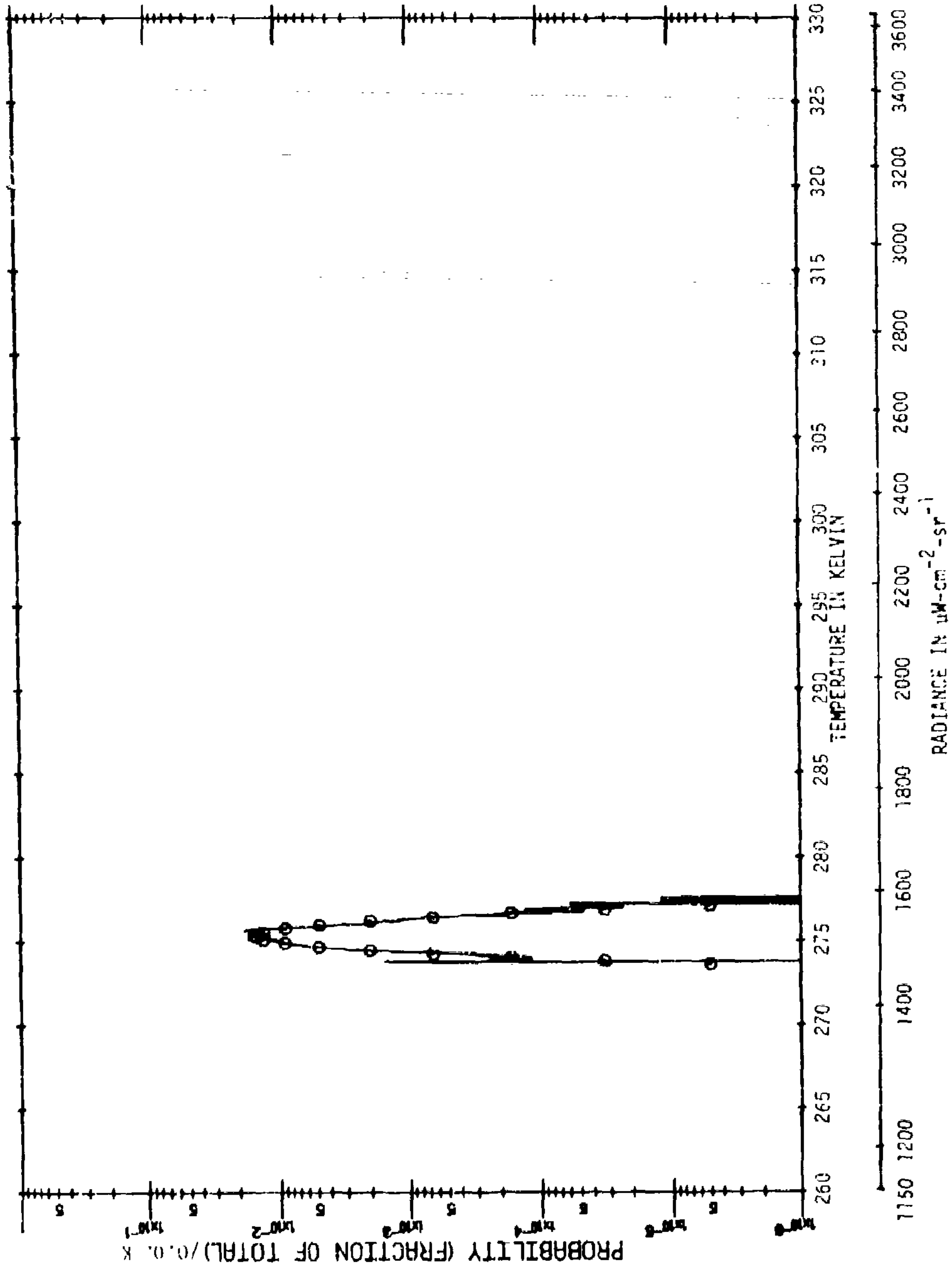
Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 275.59
Std. Dev. = 0.49

SUNSET (ANGLE: 90 DEG.)



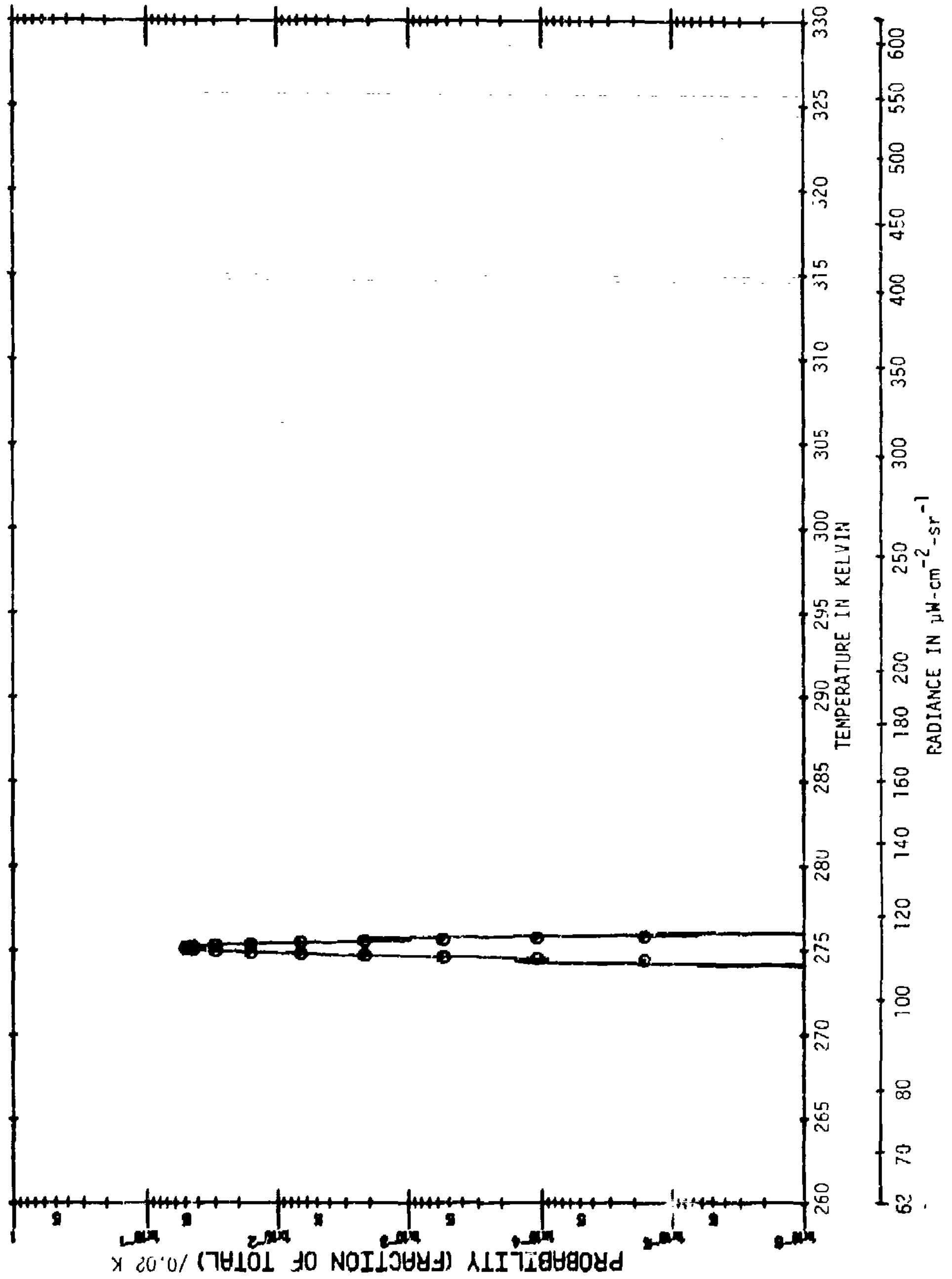
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.56
Std. Dev. = 0.29

SUNSET (ANGLE: 35 DEG.)



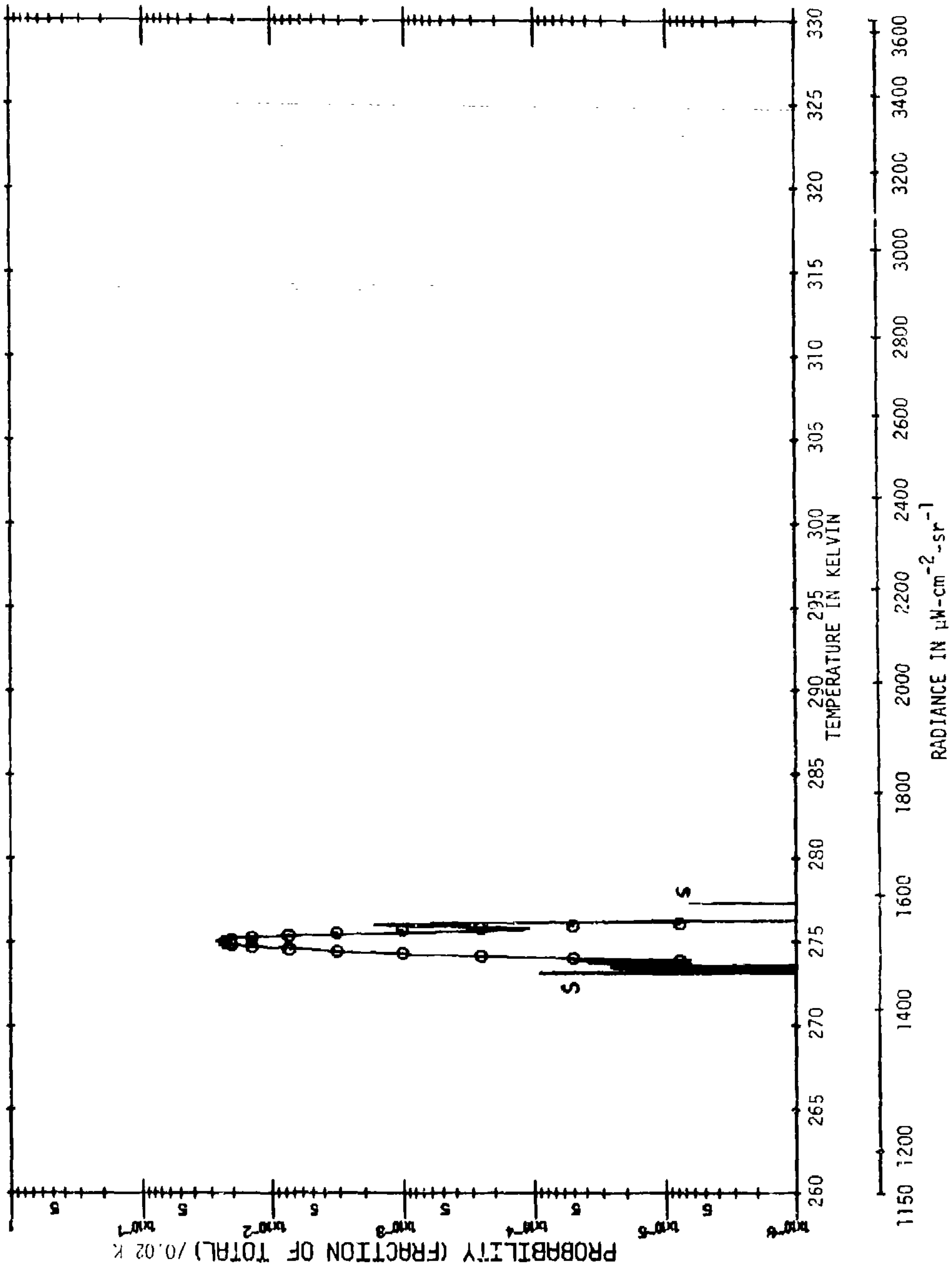
Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 275.36
Std. Dev. = 0.44

SUNSET (ANGLE: 35 DEG.)



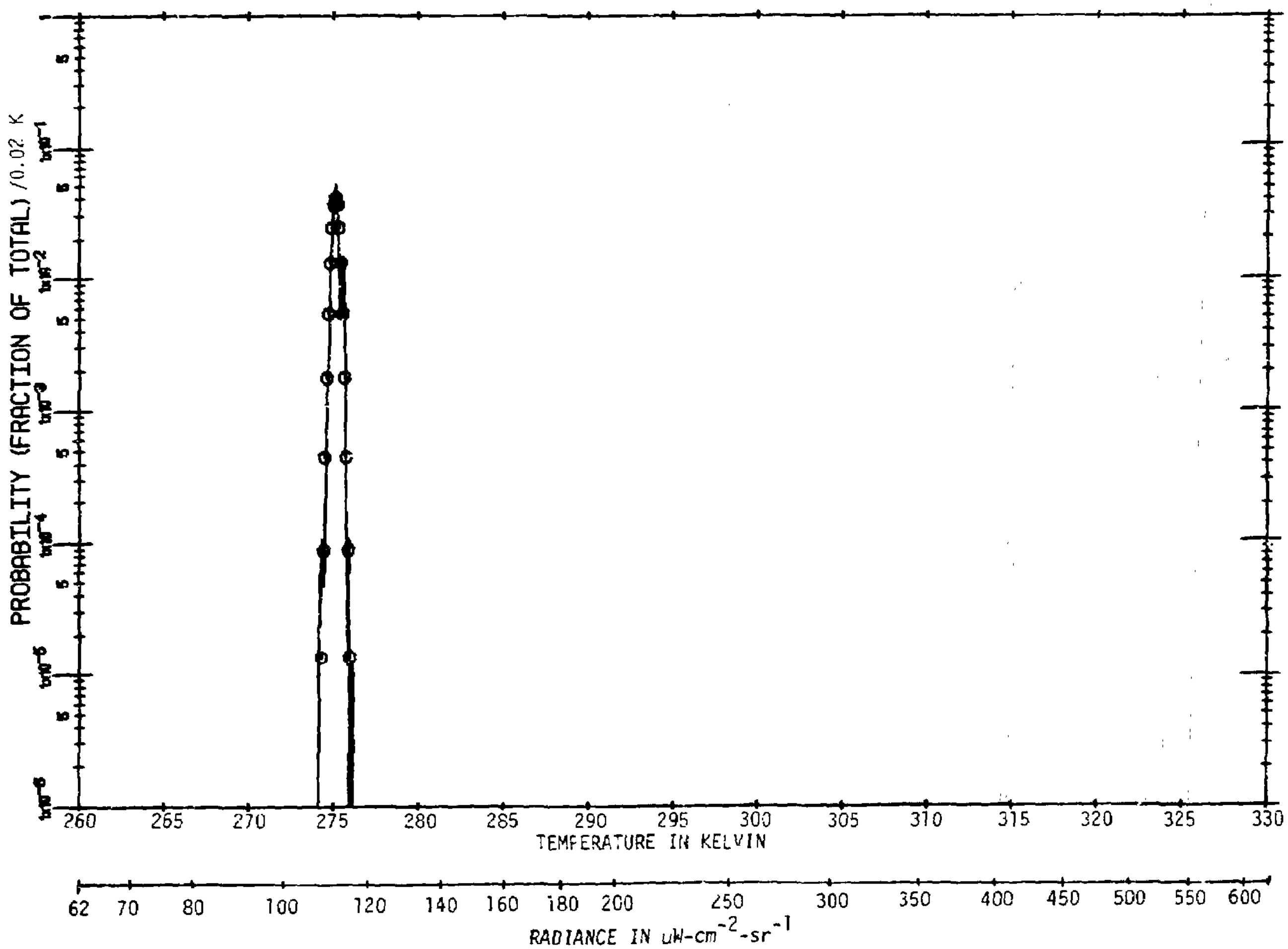
Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.14
Std. Dev. = 0.17

MIDNIGHT (ANGLE: 90 DEG.)



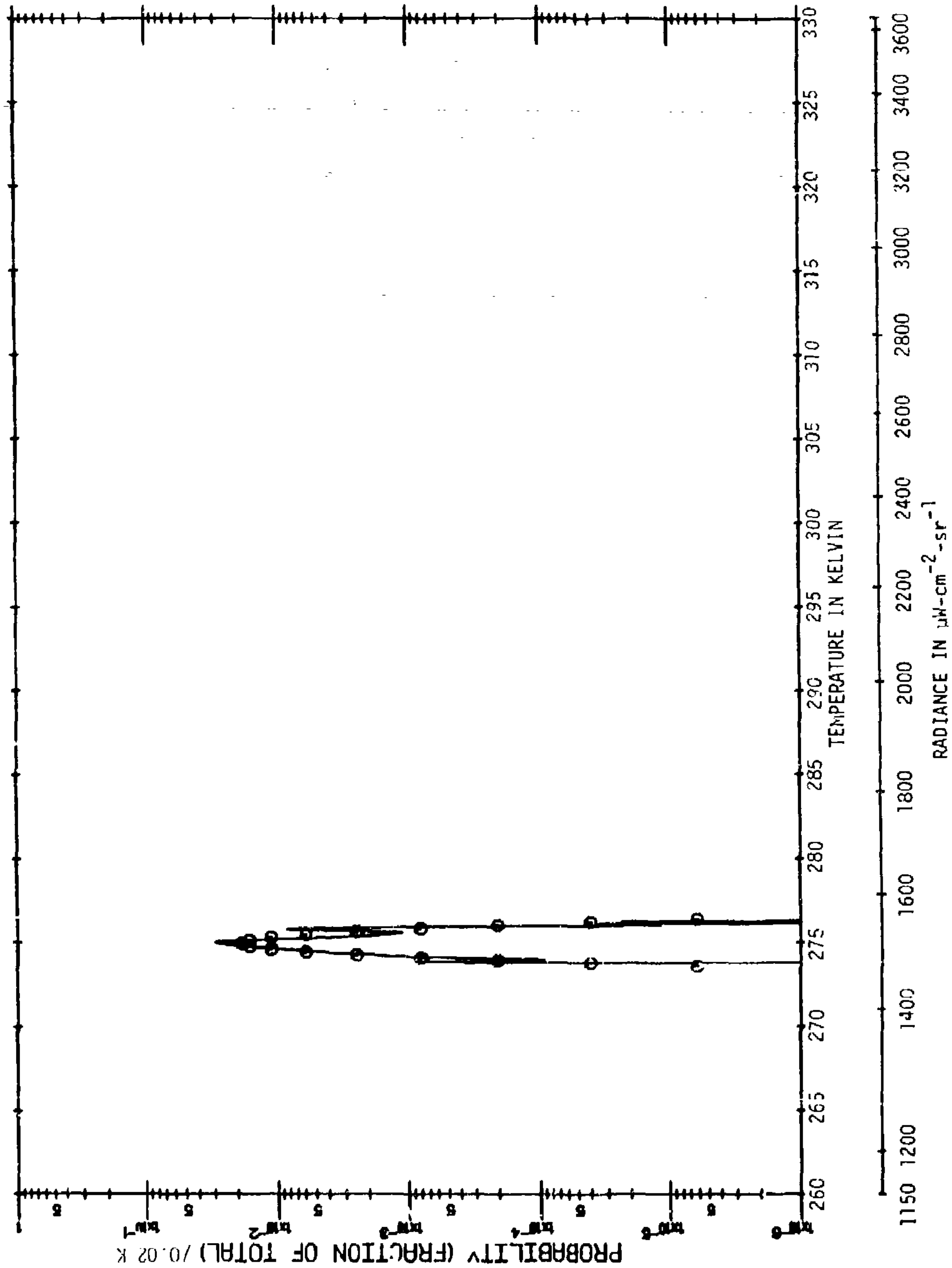
Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 275.00
Std. Dev. = 0.28

MIDNIGHT (ANGLE: 90 DEG.)



Area: CITY Wavelength = 4.5 - 5.5 μm
Mean = 275.15
Std. Dev. = 0.21

MIDNIGHT (ANGLE: 35 DEG.)



Area: CITY Wavelength = 9.0 - 11.4 μm
Mean = 274.98
Std. Dev. = 0.35

MIDNIGHT (ANGLE: 35 DEG.)

MICHIGAN WINTER SCENE - CITY

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands

Spectral Bands: Channel 8: 3.5 - 3.9 μm (°K)
Channel 10: 4.5 - 5.5 μm (°K)
Channel 12: 9.0 - 11.4 μm (°K)

CITY - PRE-DAWN

Number of Subregions:	1
Line Increment Used:	1
Pixel Increment Used:	1
Correlation Channels:	10 (4.5 - 5.5 μm)
	12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At:	123	523
Line Subarea Divisions At:	1	385

Correlation	10	12
10	1.000	
12	0.818	1.000

Channels	10	12
Mean	2.7515E+02	2.7507E+02
Standard Deviation	2.2520E-01	3.9349E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At:	123	523
Line Subarea Divisions At:	1	211

Correlation	10	12
10	1.000	
12	0.797	1.000

Channels	10	12
Mean	2.7513E+02	2.7499E+02
Standard Deviation	1.8358F-01	3.1458E-01
Total Points	84400.	84400.

CITY - NOON

Number of Subregion.	1
Line Increment Used.	1
Pixel Increment Used:	1
Correlation Channels:	8 (3.5 - 3.9 μm)
	10 (4.5 - 5.5 μm)
	12 (9.0 - 11.4 μm)

<u>90° Depression</u>

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 385

Correlation	8	10	12
8	1.000		
10	0.364	1.000	
12	0.441	0.600	1.000

Channels	8	10	12
Mean	2.8380E+02	2.7805E+02	2.7905E+02
Standard Deviation	6.2127E+00	2.0422E+00	2.7589E+00
Total Points	154000.	154000.	154000.

<u>35° Depression</u>

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 211

Correlation	8	10	12
8	1.000		
10	0.268	1.000	
12	0.442	0.465	1.000

Channels	8	10	12
Mean	2.8527E+02	2.7870E+02	2.7974E+02
Standard Deviation	5.3784E+00	2.1785E+00	2.9419E+00
Total Points	83600.	83600.	83600.

CITY - SUNSET

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.703	1.000

Channels	10	12
Mean	2.7560E+02	2.7559E+02
Standard Deviation	3.5060E-01	4.9331E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.711	1.000

Channels	10	12
Mean	2.7556E+02	2.7536E+02
Standard Deviation	2.9188E-01	4.3698E-01
Total Points	84400.	84400.

CITY - MIDNIGHT

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.707	1.000

Channels	10	12
Mean	2.7514E+02	2.7500E+02
Standard Deviation	1.7298E-01	2.7871E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

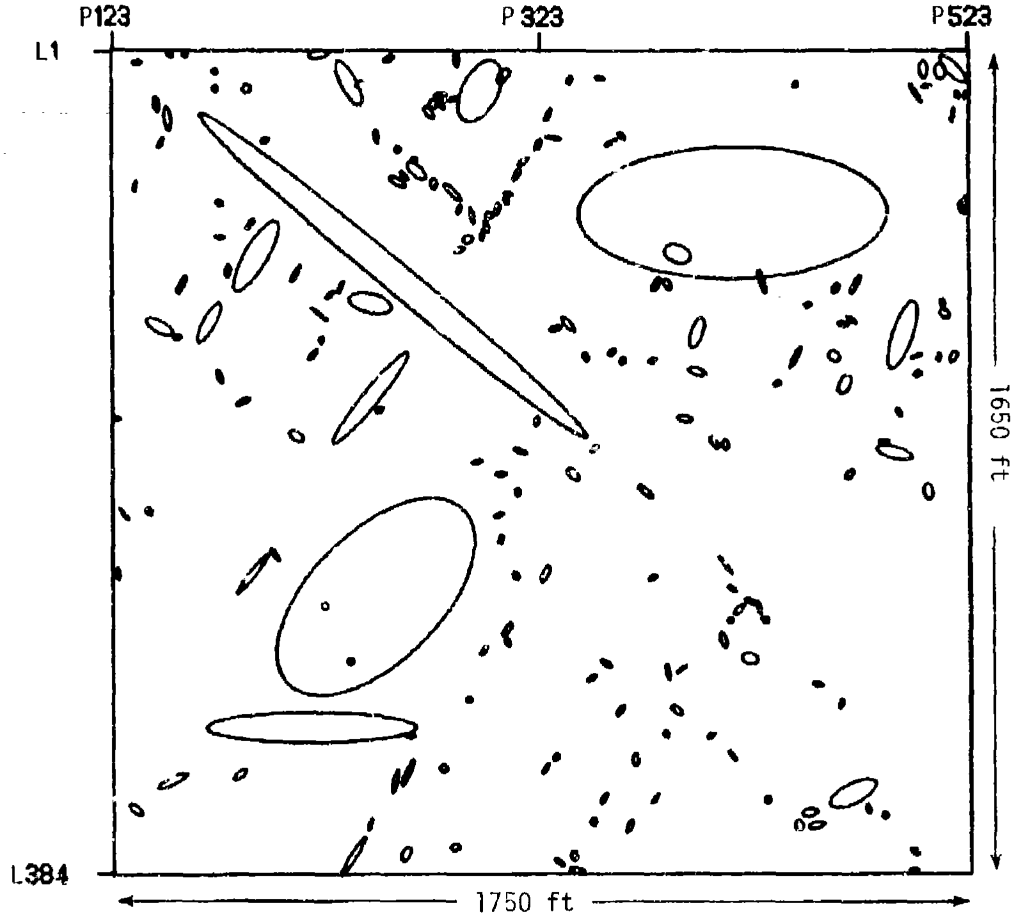
Correlation	10	12
10	1.000	
12	0.786	1.000

Channels	10	12
Mean	2.7515E+02	2.7498E+02
Standard Deviation	2.0678E-01	3.4865E-01
Total Points	84400.	84400.

MICHIGAN WINTER SCENE - CITY

Ellipse Statistics

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: CITY - Pre-Dawn (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 0.85 σ

Mean = 275.15 Kelvin

Std. Dev. = σ = 0.23 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 0.35 σ
Wavelength = 4.5 - 5.5 μm
Mean = 275.15 Kelvin
σ = 0.23 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	39
10.0	TO	15.0	64
15.0	TO	20.0	23
20.0	TO	25.0	18
25.0	TO	30.0	7
30.0	TO	35.0	10
35.0	TO	40.0	5
40.0	TO	45.0	6
45.0	TO	50.0	2
50.0	TO	75.0	4
75.0	TO	100.0	3
100.0	TO	150.0	4
150.0	TO	200.0	1
200.0	TO	250.0	1
250.0	TO	300.0	1
300.0	TO	400.0	1
400.0	TO	500.0	1
	OVER	500.0	7

TOTAL NUMBER OF ELLIPTICAL AREAS = 197

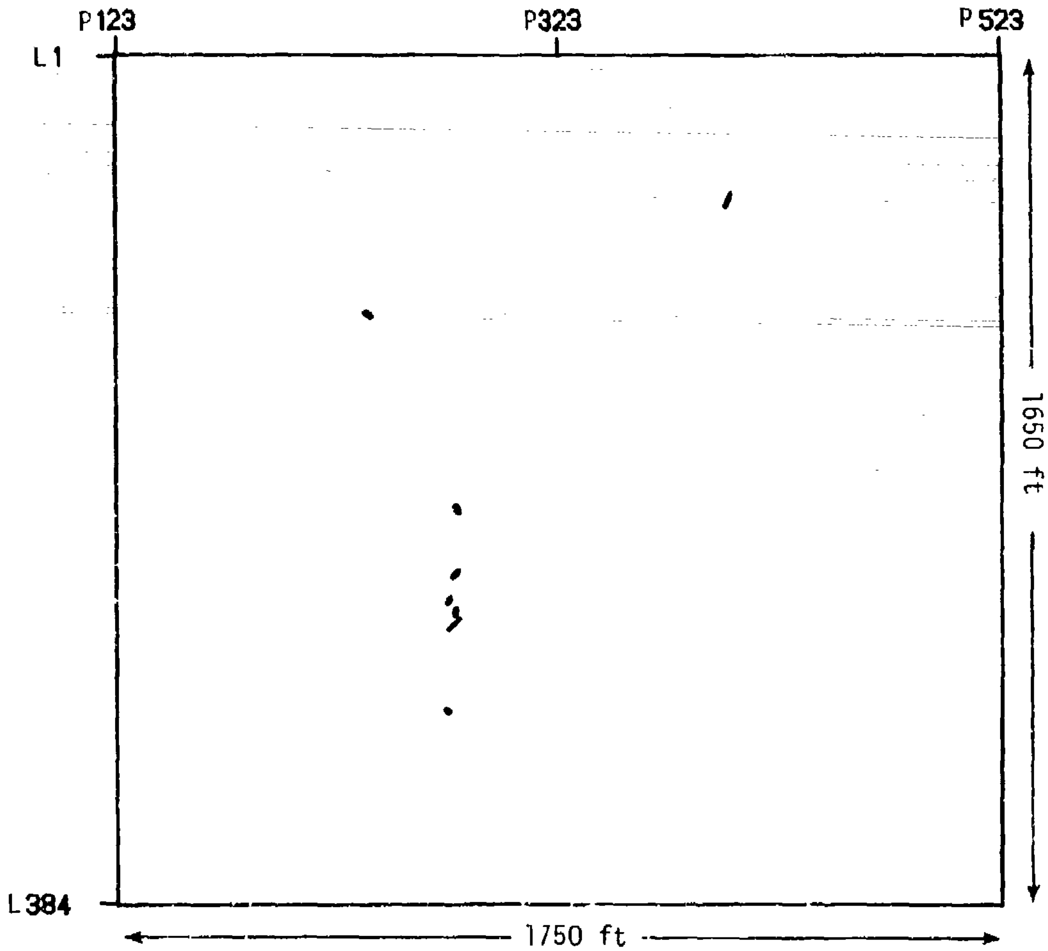
1018 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	11
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	18
17	TO	20	55	TO	65	24
20	TO	22	65	TO	72	29
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	16
26	TO	28	85	TO	91	10
28	TO	30	91	TO	98	11
30	TO	32	98	TO	104	1
32	TO	39	104	TO	127	22
39	TO	45	127	TO	147	11
45	TO	55	147	TO	180	11
55	TO	71	180	TO	232	5
71	TO	100	232	TO	328	10
	OVER	100		OVER	328	18

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	12
1.3	TO	1.4	7
1.4	TO	1.5	9
1.5	TO	1.6	15
1.6	TO	1.7	8
1.7	TO	1.8	29
1.8	TO	1.9	14
1.9	TO	2.0	12
2.0	TO	2.4	44
2.4	TO	2.6	13
2.6	TO	2.8	4
2.8	TO	3.0	6
3.0	TO	3.5	9
3.5	TO	4.0	3
4.0	TO	4.5	2
	OVER	4.5	8



Area: CITY - Pre-Dawn (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.87 σ

Mean = 275.15 Kelvin

Std. Dev. = σ = 0.23 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.87 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.15 Kelvin

σ = 0.23 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	3
10.0 TO	15.0	5
15.0 TO	20.0	0
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 8

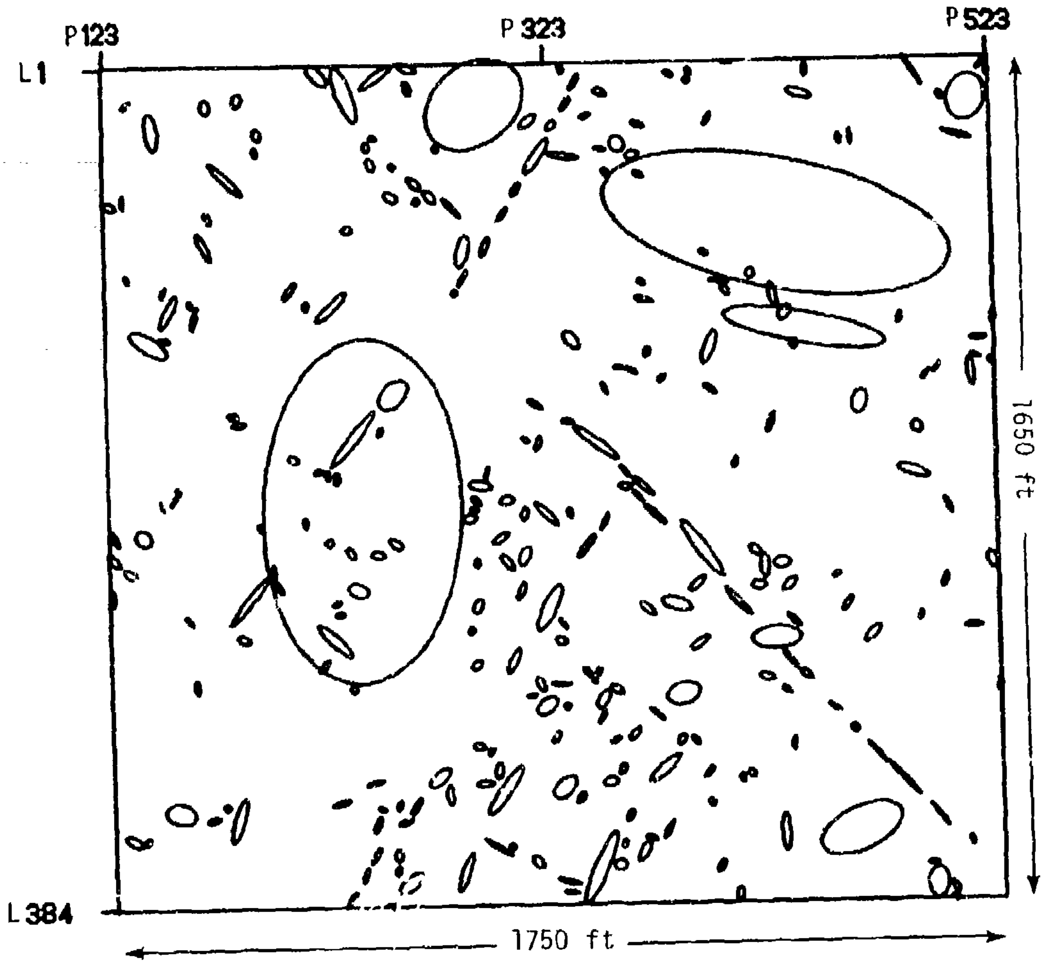
360 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	0
17 TO	20	55 TO	65	2
20 TO	22	65 TO	72	3
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	1
28 TO	30	91 TO	98	1
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	0
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	0
55 TO	71	180 TO	232	0
71 TO	100	232 TO	328	0
OVER	100	OVER	328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	1
1.5 TO 1.6	0
1.6 TO 1.7	0
1.7 TO 1.8	1
1.8 TO 1.9	1
1.9 TO 2.0	0
2.0 TO 2.4	5
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: CITY - Pre-Dawn (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 0.50 σ

Mean = 275.07 Kelvin

Std. Dev. = σ = 0.39 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 0.50 σ

Wavelength = 9.0 - 11.4 σm

Mean = 275.07 Kelvin

σ = 0.39 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	36
10.0	TO	15.0	56
15.0	TO	20.0	36
20.0	TO	25.0	40
25.0	TO	30.0	13
30.0	TO	35.0	19
35.0	TO	40.0	12
40.0	TO	45.0	8
45.0	TO	50.0	3
50.0	TO	75.0	17
75.0	TO	100.0	12
100.0	TO	150.0	12
150.0	TO	200.0	4
200.0	TO	250.0	5
250.0	TO	300.0	1
300.0	TO	400.0	2
400.0	TO	500.0	0
	OVER	500.0	6

TOTAL NUMBER OF ELLIPTICAL AREAS = 282

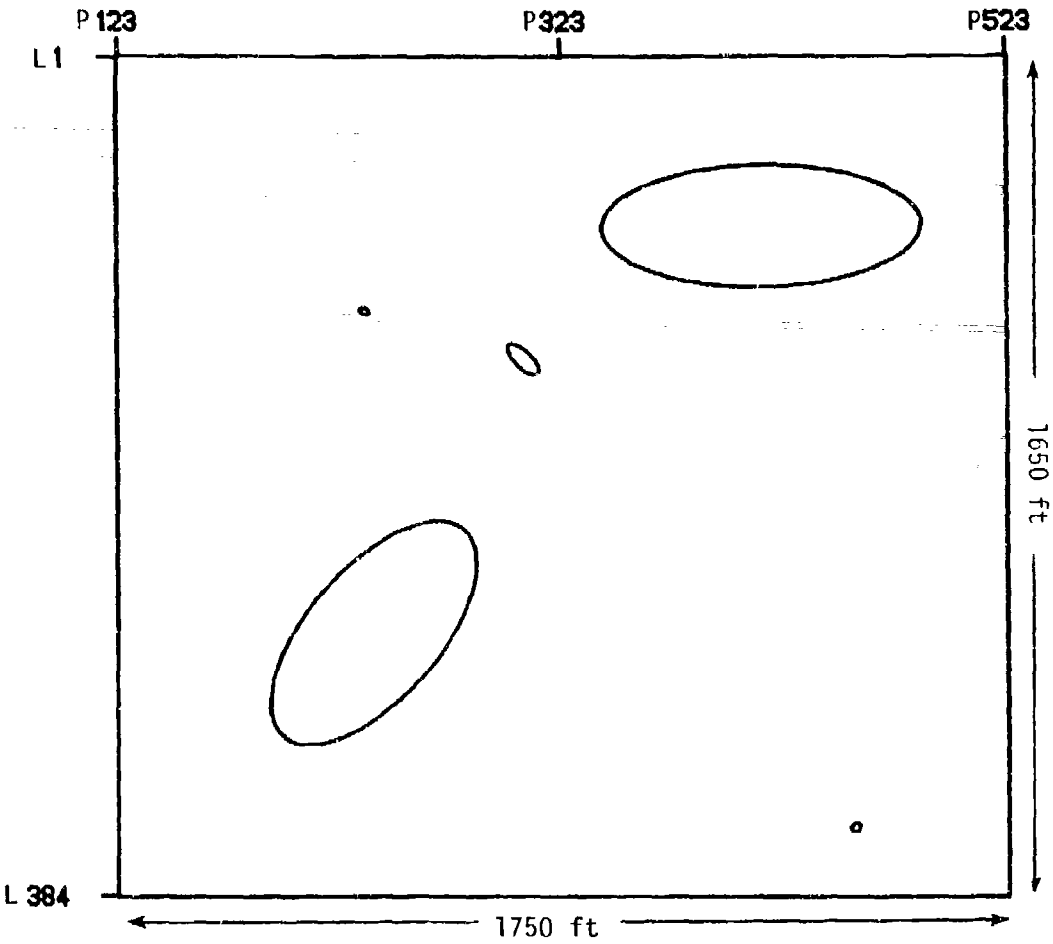
602 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	1
10	TO	12	32	TO	39	1
12	TO	14	39	TO	45	16
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	27
17	TO	20	55	TO	65	27
20	TO	22	65	TO	72	13
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	15
26	TO	28	85	TO	91	17
28	TO	30	91	TO	98	21
30	TO	32	98	TO	104	2
32	TO	39	104	TO	127	42
39	TO	45	127	TO	147	15
45	TO	55	147	TO	180	24
55	TO	71	180	TO	232	12
71	TO	100	232	TO	328	21
	OVER	100		OVER	328	28

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	2
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	20
1.3	TO	1.4	18
1.4	TO	1.5	11
1.5	TO	1.6	21
1.6	TO	1.7	25
1.7	TO	1.8	28
1.8	TO	1.9	21
1.9	TO	2.0	18
2.0	TO	2.4	52
2.4	TO	2.6	16
2.6	TO	2.8	16
2.8	TO	3.0	3
3.0	TO	3.5	15
3.5	TO	4.0	5
4.0	TO	4.5	1
	OVER	4.5	8



Area: CITY - Pre-Dawn (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.03 σ

Mean = 275.07 Kelvin

Std. Dev. = σ = 0.39 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.03 σ

Wavelength = 9.0 - 11.4 μm

Mean = 275.04 Kelvin

σ = 0.39 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	0
10.0	TO	15.0	0
15.0	TO	20.0	1
20.0	TO	25.0	1
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	1
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 5

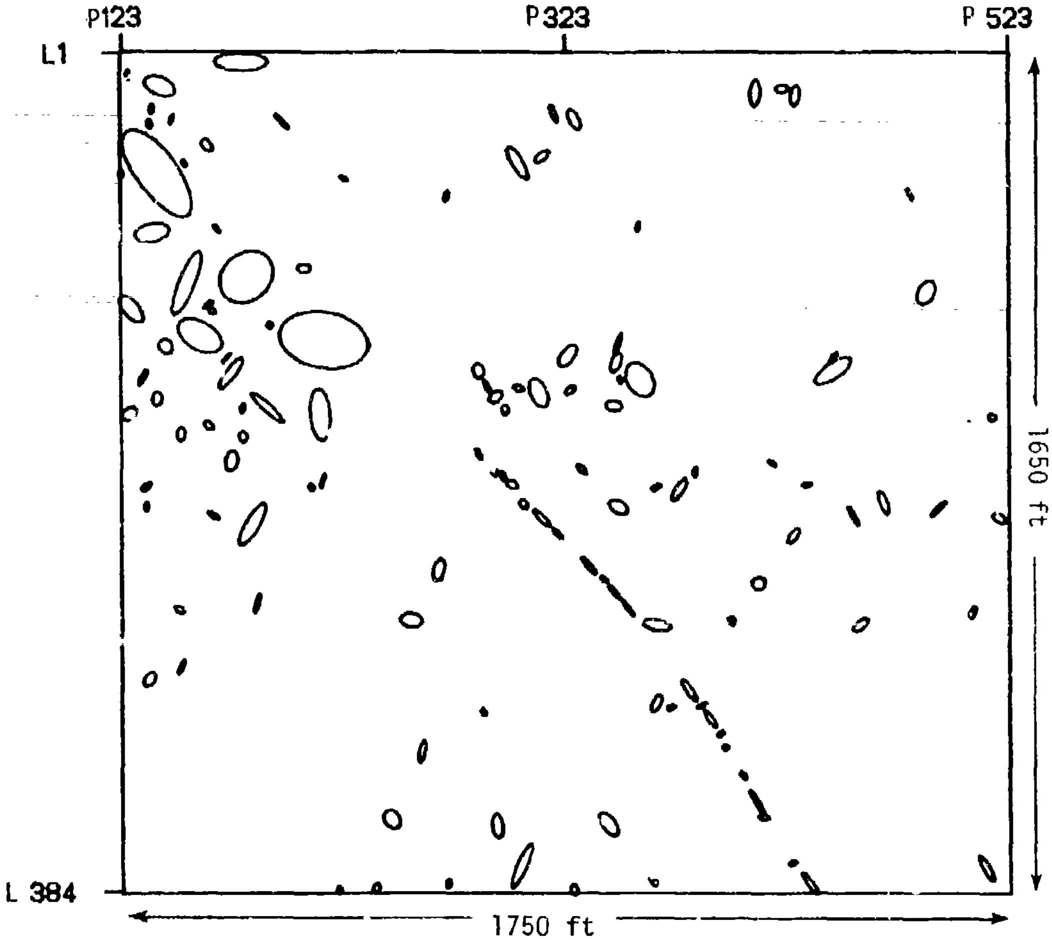
15 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
	OVER	100		OVER	328	3

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	0
1.3	TO	1.4	0
1.4	TO	1.5	1
1.5	TO	1.6	1
1.6	TO	1.7	0
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	1
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	0



Area: CITY - Noon (Wavelength = 3.5 - 3.9 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 283.80 Kelvin
Std. Dev. = σ = 6.21 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 3.5 - 3.9 μm

Mean = 283.80 Kelvin

σ = 6.21 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	21
10.0	TO	15.0	26
15.0	TO	20.0	13
20.0	TO	25.0	8
25.0	TO	30.0	2
30.0	TO	35.0	6
35.0	TO	40.0	6
40.0	TO	45.0	5
45.0	TO	50.0	5
50.0	TO	75.0	11
75.0	TO	100.0	7
100.0	TO	150.0	5
150.0	TO	200.0	4
200.0	TO	250.0	1
250.0	TO	300.0	2
300.0	TO	400.0	2
400.0	TO	500.0	0
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 127

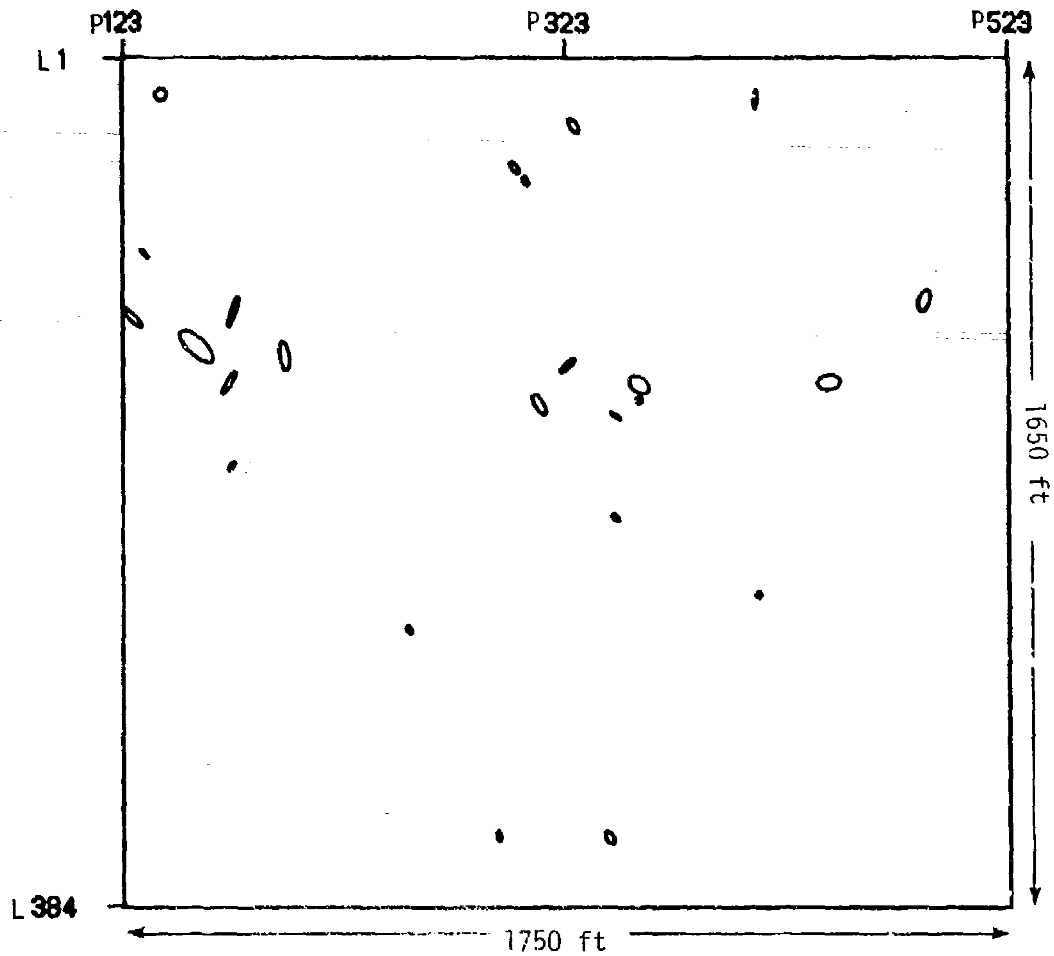
259 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	5
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	10
17	TO	20	55	TO	65	19
20	TO	22	65	TO	72	9
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	7
26	TO	28	85	TO	91	6
28	TO	30	91	TO	98	5
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	13
39	TO	45	127	TO	147	9
45	TO	55	147	TO	180	13
55	TO	71	180	TO	232	9
71	TO	100	232	TO	328	9
OVER		100	OVER		328	13

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	7
1.3	TO	1.4	4
1.4	TO	1.5	7
1.5	TO	1.6	14
1.6	TO	1.7	12
1.7	TO	1.8	20
1.8	TO	1.9	9
1.9	TO	2.0	8
2.0	TO	2.4	20
2.4	TO	2.6	5
2.6	TO	2.8	2
2.8	TO	3.0	2
3.0	TO	3.5	7
3.5	TO	4.0	4
4.0	TO	4.5	2
	OVER	4.5	2



Area: CITY - Noon (Wavelength = 3.5 - 3.9 μm)

Temperature Threshold = Mean + 3.50 σ

Mean = 283.80 Kelvin

Std. Dev. = σ = 6.21 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.50 σ

Wavelength = 3.5 - 3.9 μm

Mean = 283.80 Kelvin

σ = 6.21 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	2
10.0	TO	15.0	7
15.0	TO	20.0	1
20.0	TO	25.0	1
25.0	TO	30.0	1
30.0	TO	35.0	2
35.0	TO	40.0	1
40.0	TO	45.0	1
45.0	TO	50.0	1
50.0	TO	75.0	3
75.0	TO	100.0	3
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	1
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 24

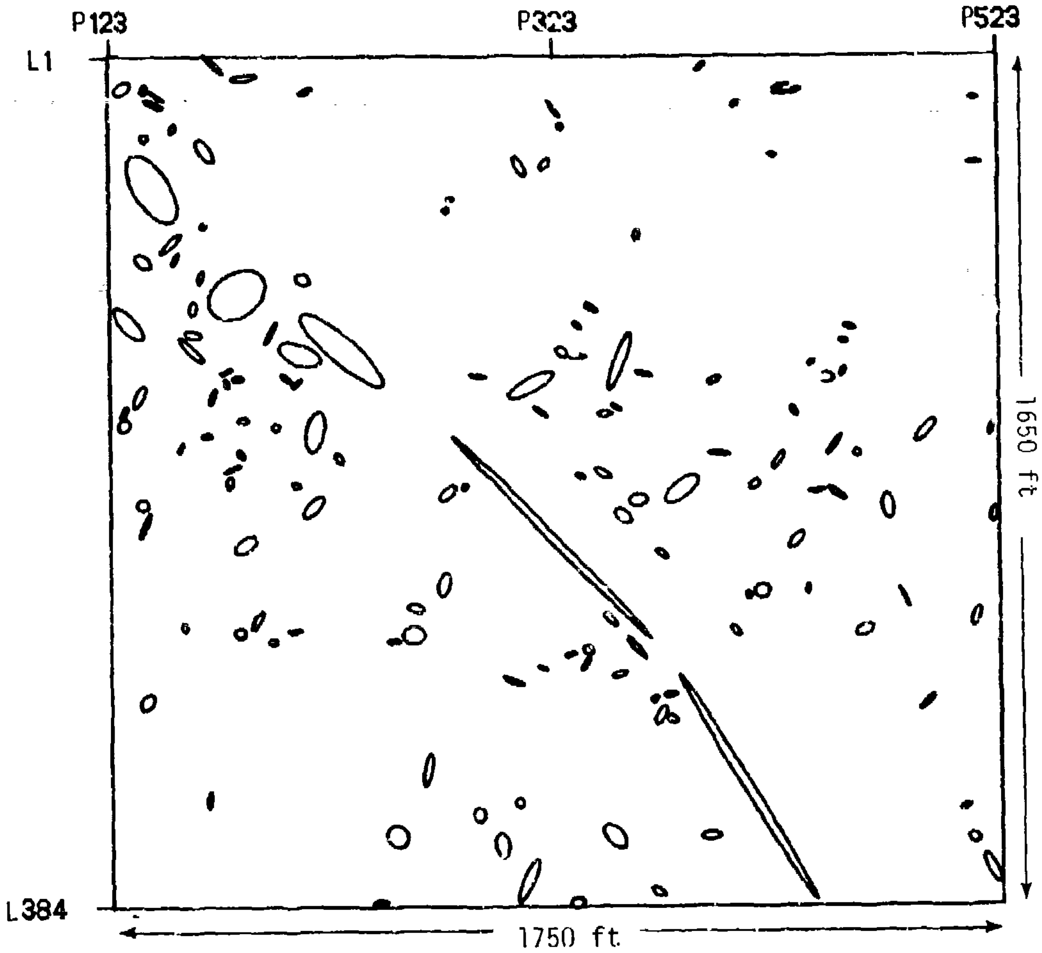
35 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	5
17	TO	20	55	TO	65	3
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	1
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	4
45	TO	55	147	TO	180	4
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	3
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	1
1.2	TO	1.3	0
1.3	TO	1.4	5
1.4	TO	1.5	3
1.5	TO	1.6	2
1.6	TO	1.7	2
1.7	TO	1.8	3
1.8	TO	1.9	2
1.9	TO	2.0	1
2.0	TO	2.4	3
2.4	TO	2.6	0
2.6	TO	2.8	1
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	0



Area: CITY - Noon (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.53 σ

Mean = 278.05 Kelvin

Std. Dev. = σ = 2.04 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.53 σ

Wavelength = 4.5 - 5.5 μm

Mean = 278.05 Kelvin

σ = 2.04 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	17
10.0 TO	15.0	31
15.0 TO	20.0	19
20.0 TO	25.0	17
25.0 TO	30.0	6
30.0 TO	35.0	0
35.0 TO	40.0	4
40.0 TO	45.0	7
45.0 TO	50.0	4
50.0 TO	75.0	12
75.0 TO	100.0	7
100.0 TO	150.0	4
150.0 TO	200.0	3
200.0 TO	250.0	3
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	5

TOTAL NUMBER OF ELLIPTICAL AREAS = 148

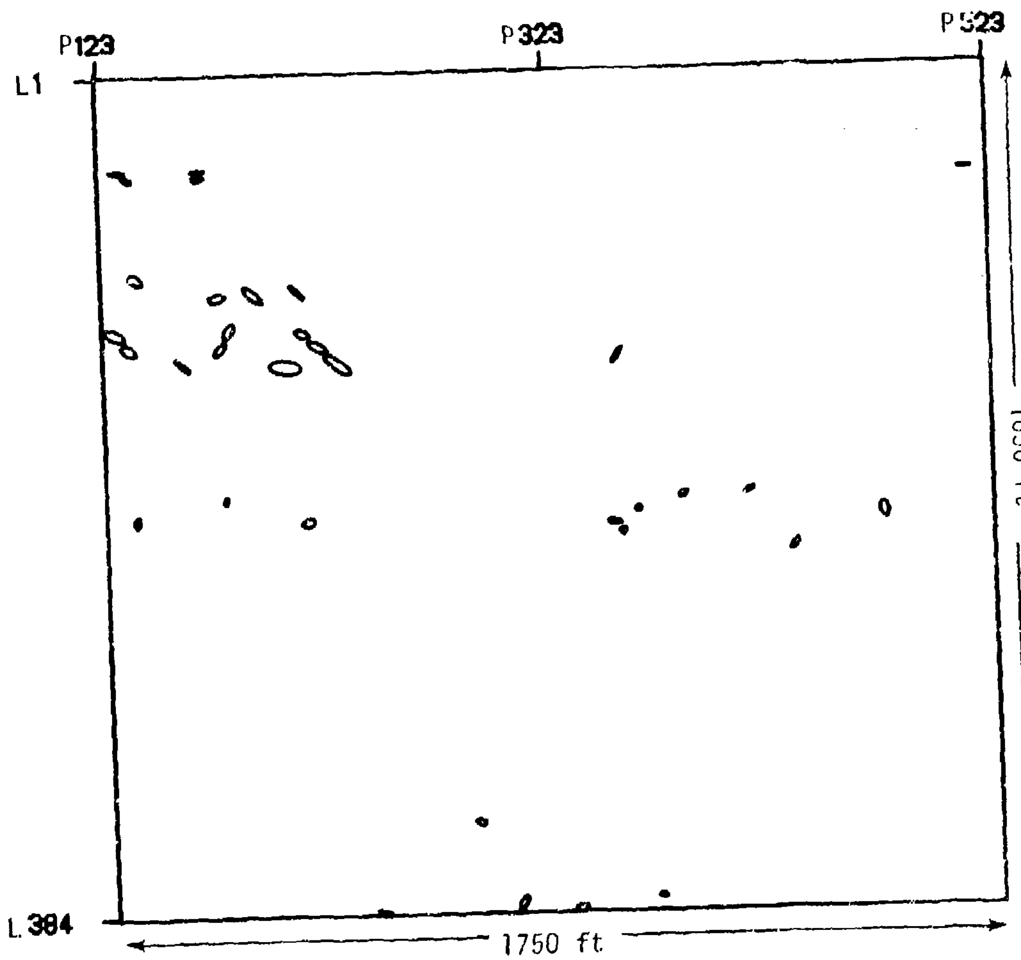
230 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	12
17 TO 20	55 TO 65	11
20 TO 22	65 TO 72	19
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	13
26 TO 28	85 TO 91	5
28 TO 30	91 TO 98	11
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	16
39 TO 45	127 TO 147	13
45 TO 55	147 TO 180	16
55 TO 71	180 TO 232	11
71 TO 100	232 TO 328	10
OVER 100	OVER 328	10

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	2
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	5
1.3 TO 1.4	4
1.4 TO 1.5	7
1.5 TO 1.6	32
1.6 TO 1.7	7
1.7 TO 1.8	17
1.8 TO 1.9	8
1.9 TO 2.0	5
2.0 TO 2.4	30
2.4 TO 2.6	7
2.6 TO 2.8	5
2.8 TO 3.0	7
3.0 TO 3.5	4
3.5 TO 4.0	3
4.0 TO 4.5	1
OVER 4.5	4



Area: CITY - Noon (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.29 σ
Mean = 278.05 Kelvin
Std. Dev. = σ = 2.04 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.29 σ

Wavelength = 4.5 - 5.5 μm

Mean = 278.05 Kelvin

σ = 2.04 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	5
10.0 TO	15.0	5
15.0 TO	20.0	8
20.0 TO	25.0	2
25.0 TO	30.0	2
30.0 TO	35.0	2
35.0 TO	40.0	3
40.0 TO	45.0	2
45.0 TO	50.0	2
50.0 TO	75.0	1
75.0 TO	100.0	1
100.0 TO	150.0	1
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 34

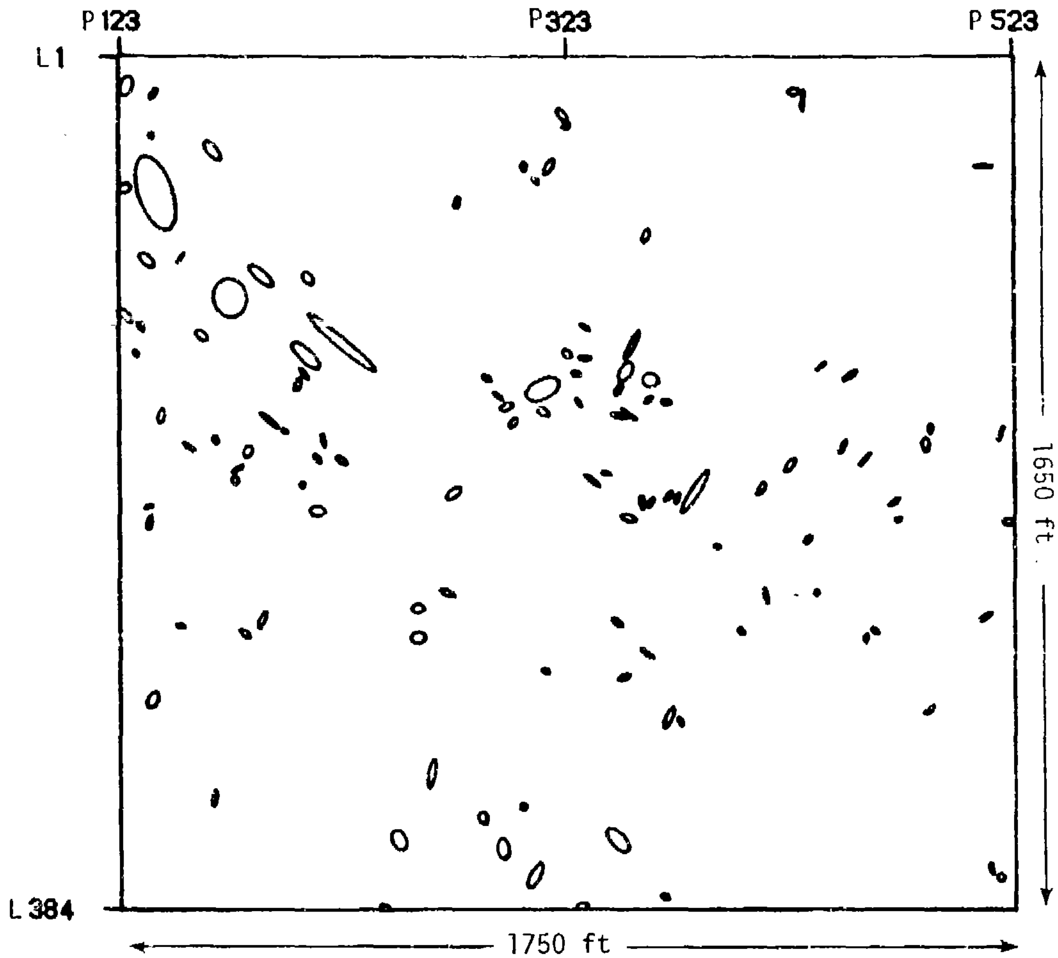
109 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	3
14 TO 16	45 TO 52	1
16 TO 17	52 TO 55	5
17 TO 20	55 TO 65	3
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	3
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	5
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	4
39 TO 45	127 TO 147	3
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	2
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	2
1.3 TO 1.4	5
1.4 TO 1.5	5
1.5 TO 1.6	8
1.6 TO 1.7	2
1.7 TO 1.8	1
1.8 TO 1.9	2
1.9 TO 2.0	4
2.0 TO 2.4	3
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: CITY - Noon (Wavelength = 9.0 - 11.4 μm)
Temperature Threshold = Mean + 2.82 σ
Mean = 2/9.05 Kelvin
Std. Dev. = σ = 2.76 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.82 σ

Wavelength = 9.0 - 11.4 μm

Mean = 279.05 Kelvin

σ = 2.76 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	17
10.0 TO	15.0	34
15.0 TO	20.0	19
20.0 TO	25.0	13
25.0 TO	30.0	4
30.0 TO	35.0	6
35.0 TO	40.0	3
40.0 TO	45.0	4
45.0 TO	50.0	3
50.0 TO	75.0	7
75.0 TO	100.0	2
100.0 TO	150.0	3
150.0 TO	200.0	1
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 119

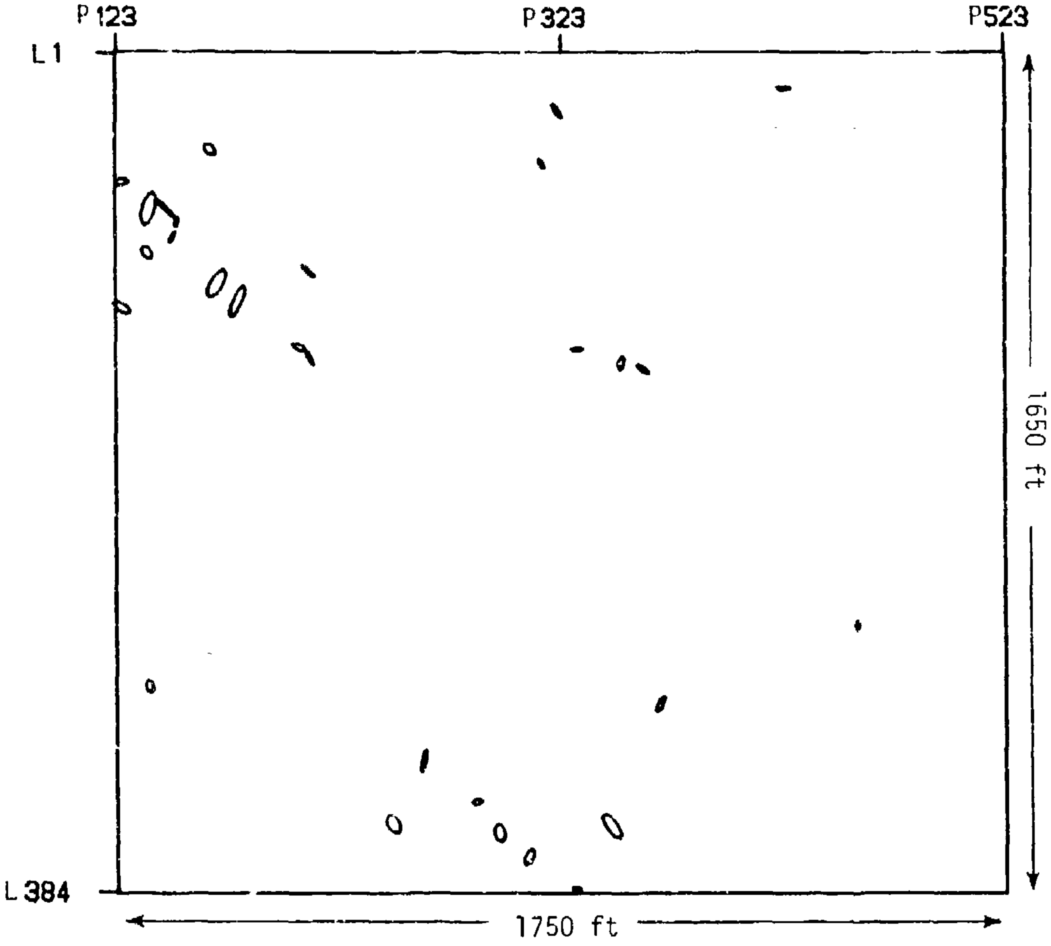
207 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	3
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	7
17 TO	20	55 TO	65	18
20 TO	22	65 TO	72	7
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	16
26 TO	28	85 TO	91	8
28 TO	30	91 TO	98	6
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	14
39 TO	45	127 TO	147	5
45 TO	55	147 TO	180	17
55 TO	71	180 TO	232	8
71 TO	100	232 TO	328	4
OVER	100	OVER	328	6

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	3
1.3 TO 1.4	9
1.4 TO 1.5	5
1.5 TO 1.6	13
1.6 TO 1.7	10
1.7 TO 1.8	16
1.8 TO 1.9	4
1.9 TO 2.0	7
2.0 TO 2.4	24
2.4 TO 2.6	5
2.6 TO 2.8	11
2.8 TO 3.0	3
3.0 TO 3.5	5
3.5 TO 4.0	2
4.0 TO 4.5	1
OVER 4.5	1



Area: CITY - Noon (Wavelength = 9.0 - 11.4 μm)

Temperature Thresnold = Mean + 3.57 σ

Mean = 279.05 Kelvin

Std. Dev. = σ = 2.76 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.57 σ

Wavelength = 9.0 - 11.4 μm

Mean = 279.05 Kelvin

σ = 2.76 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	5
10.0 TO	15.0	6
15.0 TO	20.0	2
20.0 TO	25.0	5
25.0 TO	30.0	1
30.0 TO	35.0	3
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	1
50.0 TO	75.0	1
75.0 TO	100.0	2
100.0 TO	150.0	2
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 29

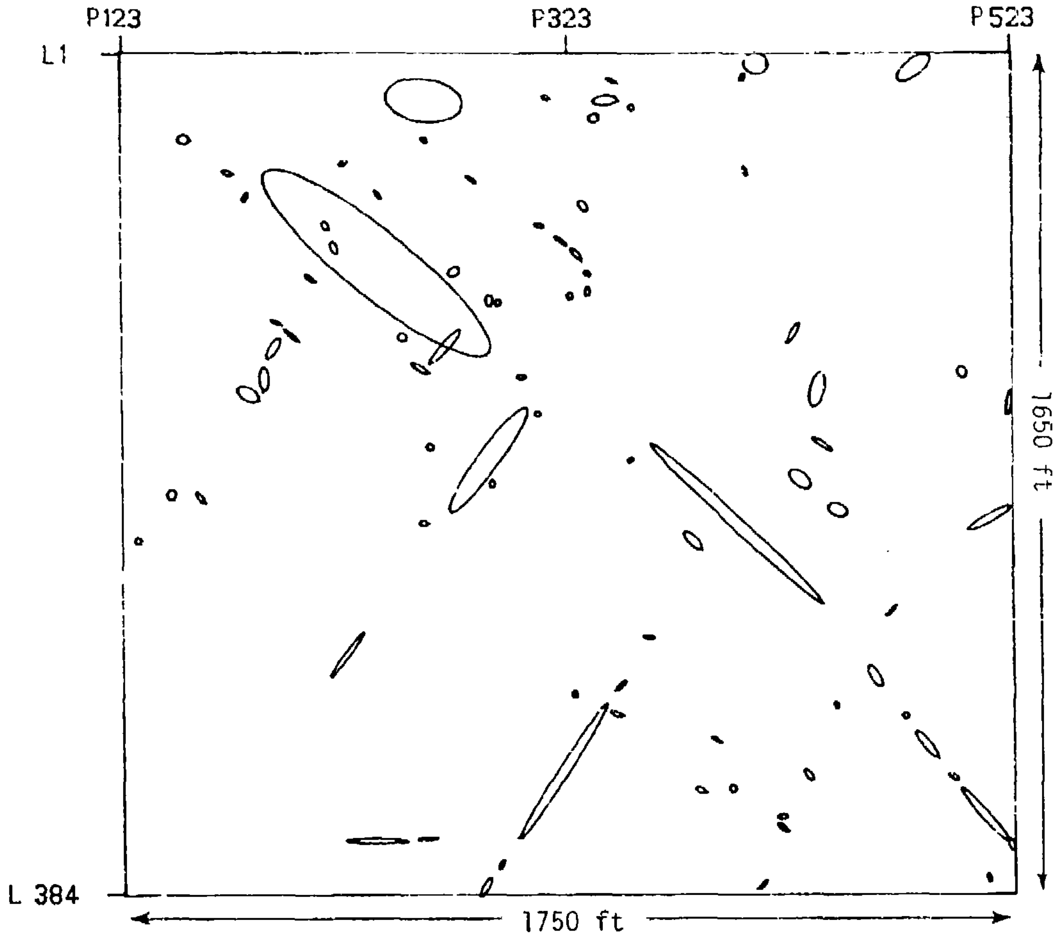
210 FEATURES WITH AREAS LESS THAN 6.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	4
20 TO 22	65 TO 72	2
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	1
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	7
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	2
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	1
1.4 TO 1.5	0
1.5 TO 1.6	5
1.6 TO 1.7	4
1.7 TO 1.8	3
1.8 TO 1.9	4
1.9 TO 2.0	2
2.0 TO 2.4	7
2.4 TO 2.6	2
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: CITY - Sunset (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean = 2.00 σ

Mean = 275.60 Kelvin

Std. Dev. = σ = 0.35 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 275.60 Kelvin
σ = 0.35 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	11
10.0	TO	15.0	27
15.0	TO	20.0	8
20.0	TO	25.0	7
25.0	TO	30.0	3
30.0	TO	35.0	4
35.0	TO	40.0	3
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	7
75.0	TO	100.0	3
100.0	TO	150.0	5
150.0	TO	200.0	2
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	4

TOTAL NUMBER OF ELLIPTICAL AREAS = 85

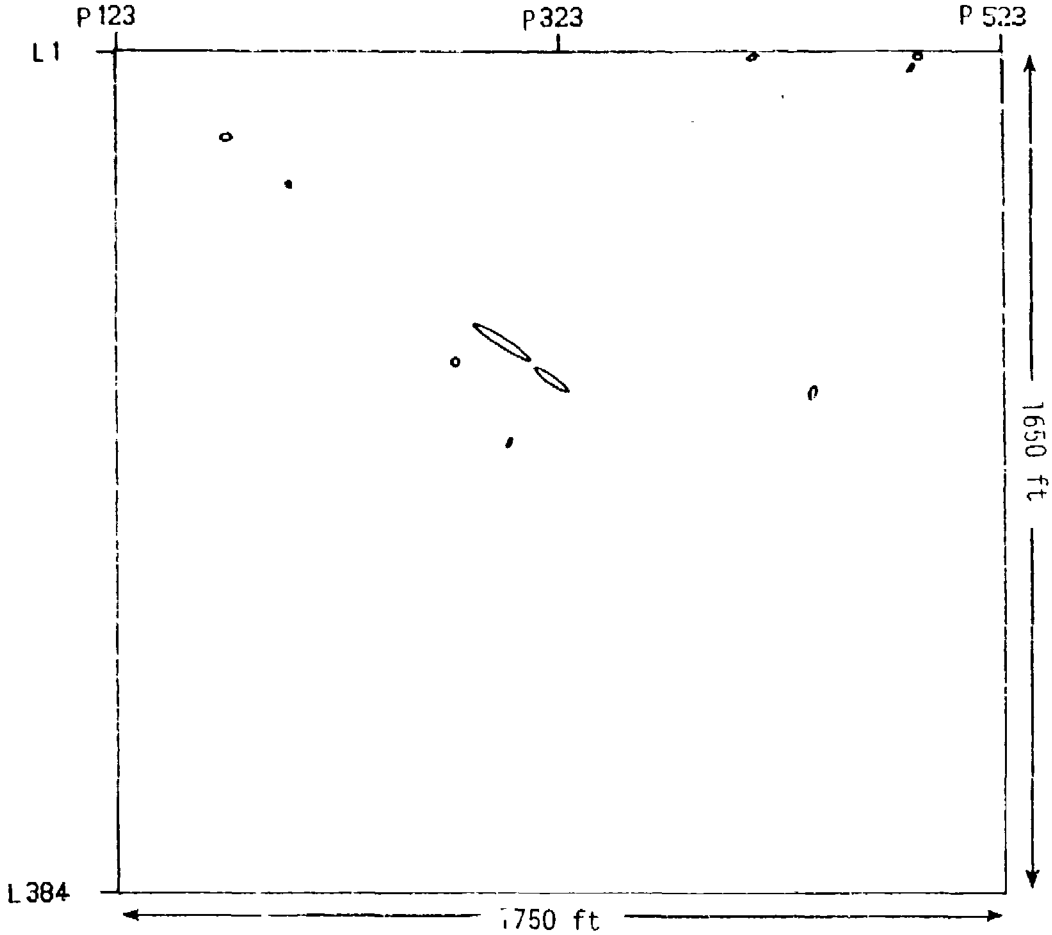
114 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	5
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	8
17 TO 20	55 TO 65	11
20 TO 22	65 TO 72	12
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	7
26 TO 28	85 TO 91	8
28 TO 30	91 TO 98	3
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	5
39 TO 45	127 TO 147	4
45 TO 55	147 TO 180	4
55 TO 71	180 TO 232	3
71 TO 100	232 TO 328	7
OVER 100	OVER 328	8

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	7
1.3 TO 1.4	7
1.4 TO 1.5	9
1.5 TO 1.6	10
1.6 TO 1.7	6
1.7 TO 1.8	15
1.8 TO 1.9	3
1.9 TO 2.0	4
2.0 TO 2.4	11
2.4 TO 2.6	0
2.6 TO 2.8	3
2.8 TO 3.0	2
3.0 TO 3.5	1
3.5 TO 4.0	1
4.0 TO 4.5	3
OVER 4.5	2



Area: CITY - Sunset (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.71 σ
Mean = 275.60 Kelvin
Std. Dev. = σ = 0.35 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.71 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.60 Kelvin

σ = 0.35 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	3
10.0	TO	15.0	1
15.0	TO	20.0	2
20.0	TO	25.0	2
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	1
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 10

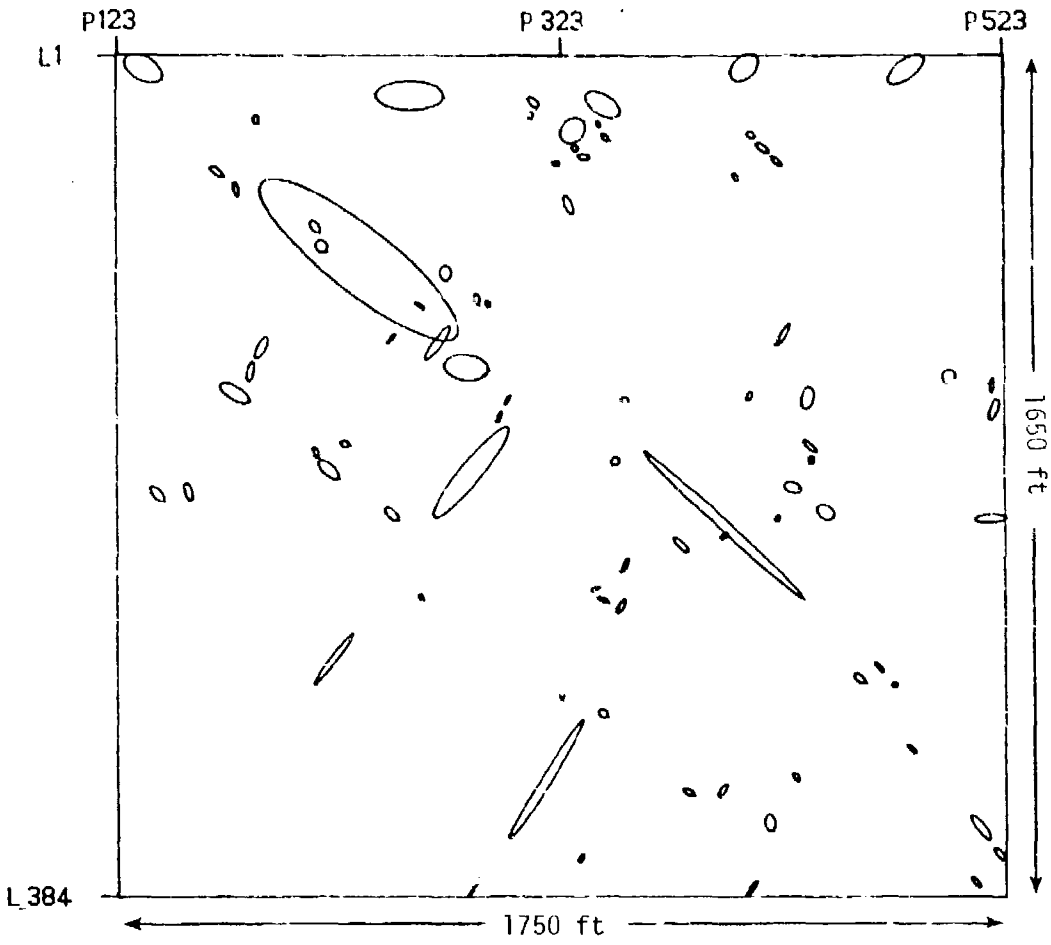
19 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	2
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	1
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	2
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	1
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	0
1.3	TO	1.4	2
1.4	TO	1.5	0
1.5	TO	1.6	2
1.6	TO	1.7	0
1.7	TO	1.8	2
1.8	TO	1.9	2
1.9	TO	2.0	0
2.0	TO	2.4	0
2.4	TO	2.6	0
2.6	TO	2.8	1
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	0



Area: CITY - Sunset (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.69 σ

Mean = 275.59 Kelvin

Std. Dev. = σ = 0.49 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.69 σ

Wavelength = 9.0 - 11.4 μm

Mean = 275.59 Kelvin

σ = 0.49 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	8
10.0 TO 15.0	18
15.0 TO 20.0	11
20.0 TO 25.0	7
25.0 TO 30.0	5
30.0 TO 35.0	1
35.0 TO 40.0	4
40.0 TO 45.0	2
45.0 TO 50.0	4
50.0 TO 75.0	6
75.0 TO 100.0	3
100.0 TO 150.0	3
150.0 TO 200.0	1
200.0 TO 250.0	3
250.0 TO 300.0	1
300.0 TO 400.0	1
400.0 TO 500.0	1
OVER 500.0	4

TOTAL NUMBER OF ELLIPTICAL AREAS = 83

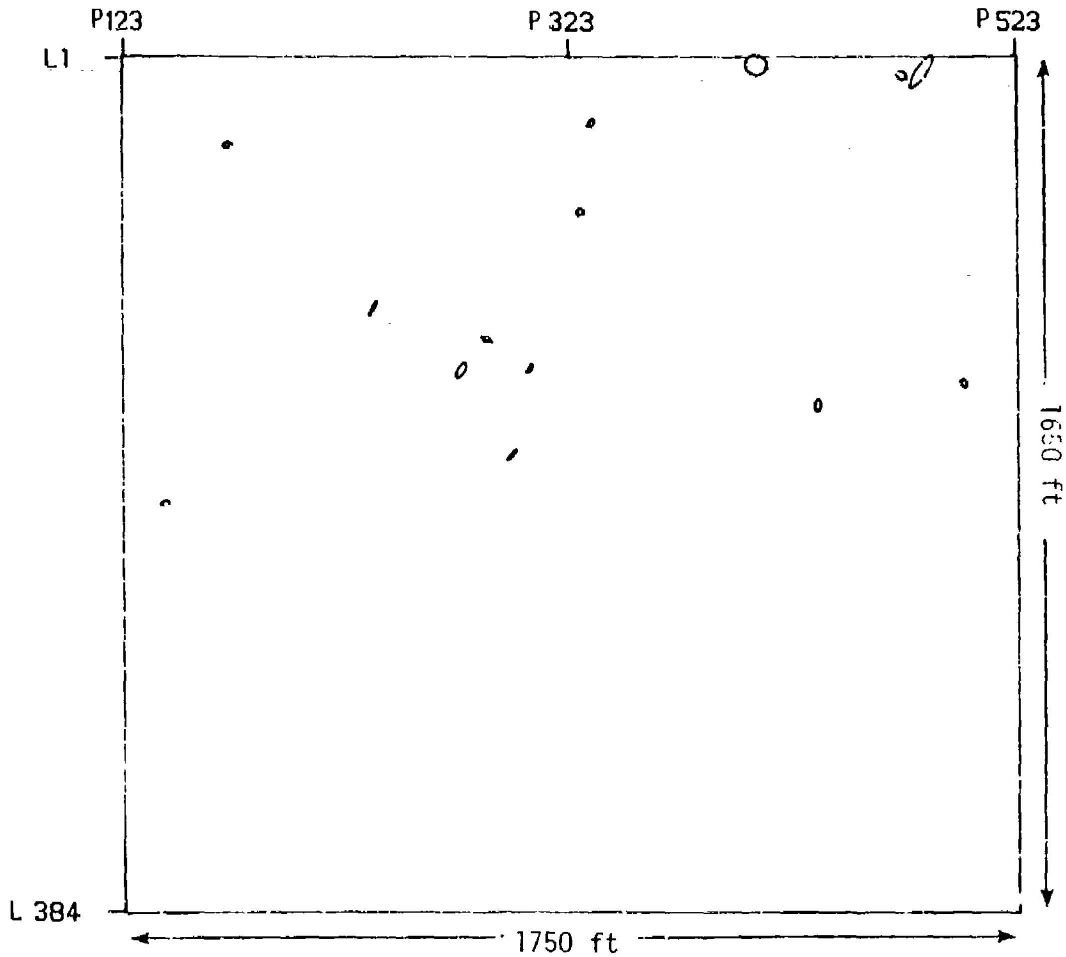
171 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	7
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	3
17 TO 20	55 TO 65	6
20 TO 22	65 TO 72	5
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	7
26 TO 28	85 TO 91	7
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	10
39 TO 45	127 TO 147	11
45 TO 55	147 TO 180	5
55 TO 71	180 TO 232	4
71 TO 100	232 TO 328	3
OVER 100	OVER 328	11

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	7
1.3 TO 1.4	5
1.4 TO 1.5	1
1.5 TO 1.6	4
1.6 TO 1.7	10
1.7 TO 1.8	16
1.8 TO 1.9	11
1.9 TO 2.0	7
2.0 TO 2.4	8
2.4 TO 2.6	3
2.6 TO 2.8	1
2.8 TO 3.0	0
3.0 TO 3.5	3
3.5 TO 4.0	1
4.0 TO 4.5	2
OVER 4.5	3



Area: CITY - Sunset (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 275.59 Kelvin

Std. Dev. = σ = 0.49 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 275.59 Kelvin

σ = 0.49 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	1
10.0 TO 15.0	7
15.0 TO 20.0	2
20.0 TO 25.0	1
25.0 TO 30.0	0
30.0 TO 35.0	1
35.0 TO 40.0	0
40.0 TO 45.0	0
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	2
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 14

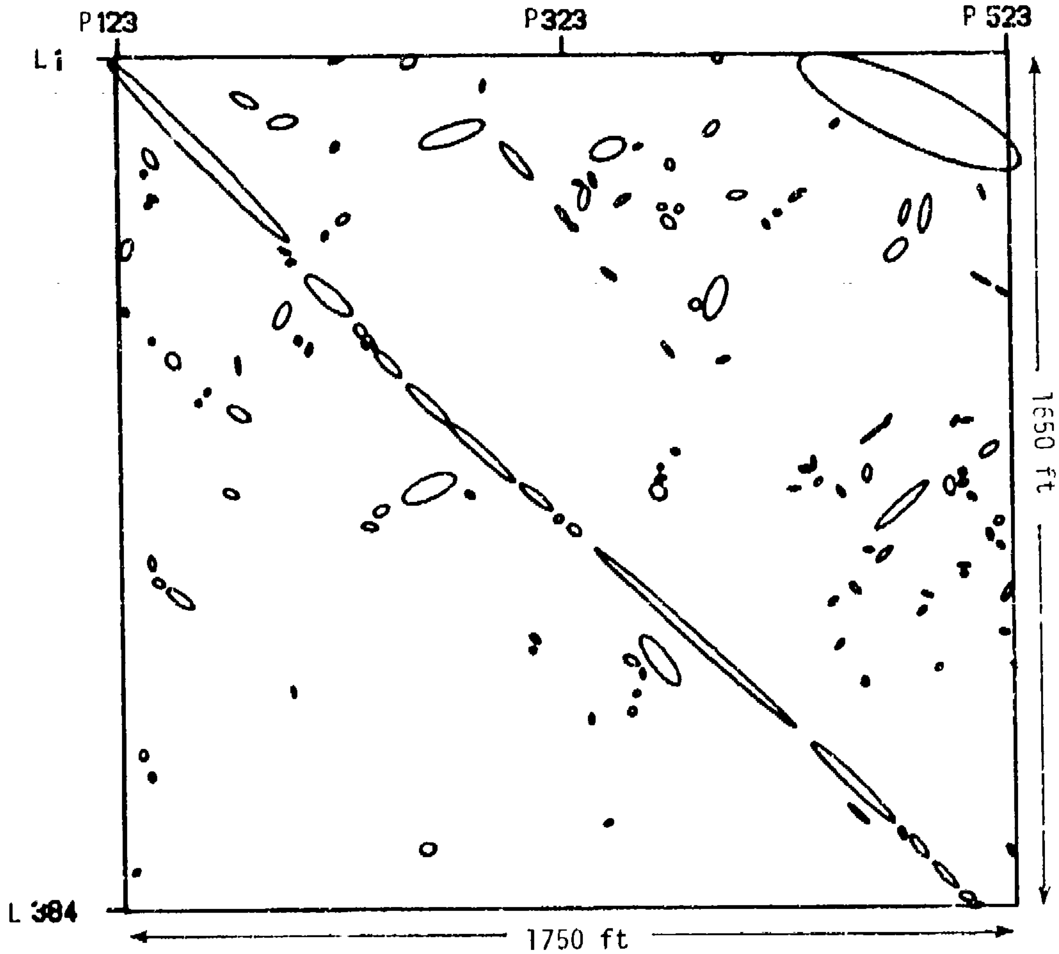
28 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	4
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	0
1.3 TO 1.4	2
1.4 TO 1.5	3
1.5 TO 1.6	2
1.6 TO 1.7	0
1.7 TO 1.8	1
1.8 TO 1.9	3
1.9 TO 2.0	1
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: CITY - Midnight (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 1.50 σ

Mean = 275.14 Kelvin

Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

CITY - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.14 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	24
10.0 TO	15.0	31
15.0 TO	20.0	19
20.0 TO	25.0	8
25.0 TO	30.0	4
30.0 TO	35.0	8
35.0 TO	40.0	4
40.0 TO	45.0	3
45.0 TO	50.0	4
50.0 TO	75.0	10
75.0 TO	100.0	6
100.0 TO	150.0	3
150.0 TO	200.0	2
200.0 TO	250.0	3
250.0 TO	300.0	1
300.0 TO	400.0	4
400.0 TO	500.0	0
OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 137

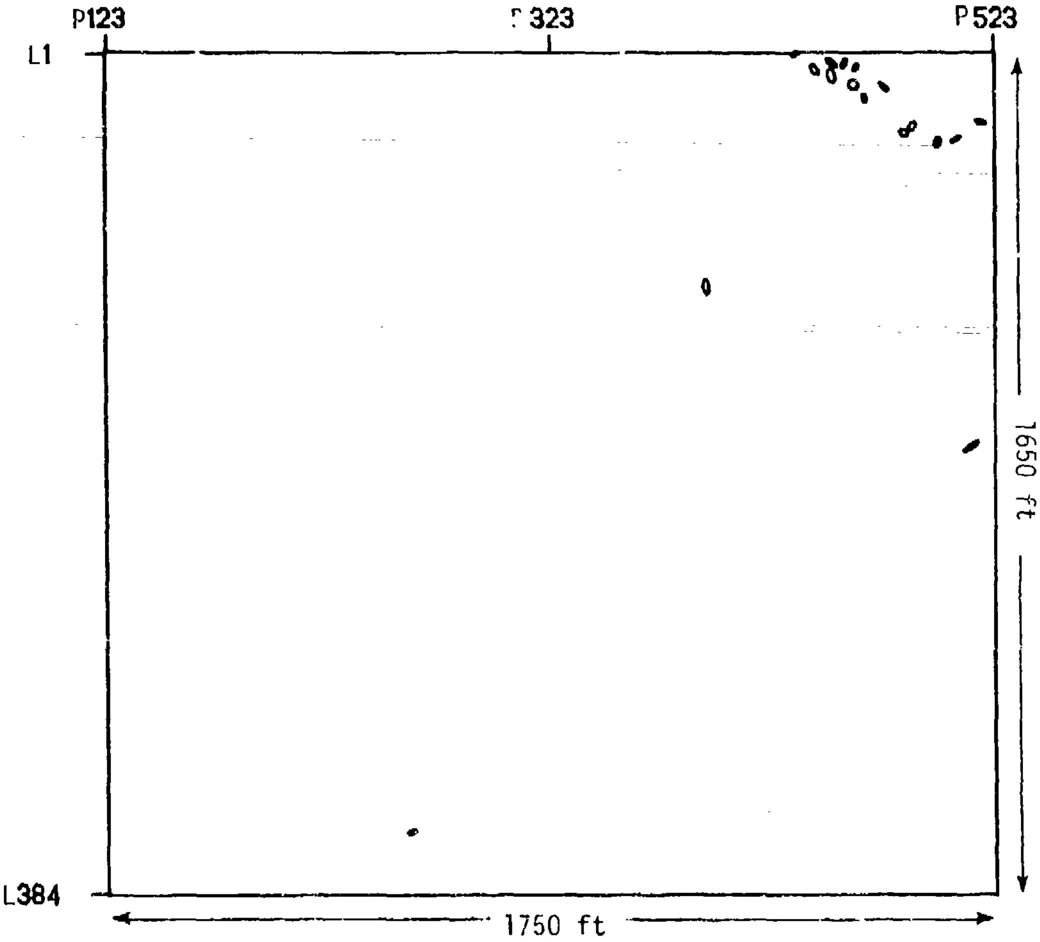
881 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	1
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	3
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	17
17 TO 20	55 TO 65	11
20 TO 22	65 TO 72	7
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	15
26 TO 28	85 TO 91	7
28 TO 30	91 TO 98	7
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	14
39 TO 45	127 TO 147	12
45 TO 55	147 TO 180	10
55 TO 71	180 TO 232	5
71 TO 100	232 TO 328	12
OVER 100	OVER 328	16

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	6
1.3 TO 1.4	5
1.4 TO 1.5	4
1.5 TO 1.6	16
1.6 TO 1.7	6
1.7 TO 1.8	15
1.8 TO 1.9	7
1.9 TO 2.0	13
2.0 TO 2.4	27
2.4 TO 2.6	10
2.6 TO 2.8	9
2.8 TO 3.0	4
3.0 TO 3.5	2
3.5 TO 4.0	5
4.0 TO 4.5	2
OVER 4.5	5



Area: CITY - Midnight (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.63 σ
Mean = 275.14 Kelvin
Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS

CITY - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.63 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.14 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	6
10.0 TO	15.0	3
15.0 TO	20.0	4
20.0 TO	25.0	3
25.0 TO	30.0	0
30.0 TO	35.0	1
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 17

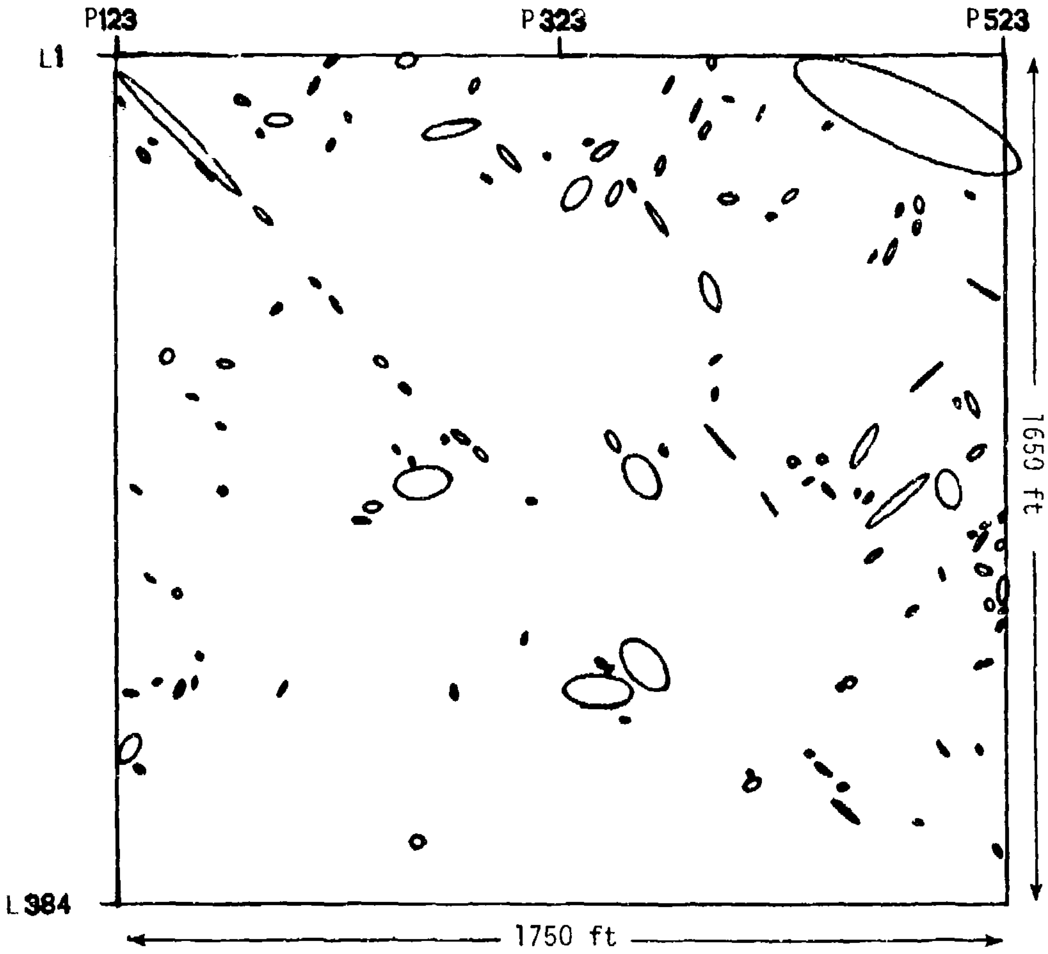
106 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	2
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	1
17 TO	20	55 TO	65	3
20 TO	22	65 TO	72	1
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	5
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	0
39 TO	45	127 TO	147	1
45 TO	55	147 TO	180	2
55 TO	71	180 TO	232	1
71 TO	100	232 TO	328	0
OVER	100	OVER	328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	2
1.3 TO 1.4	0
1.4 TO 1.5	1
1.5 TO 1.6	2
1.6 TO 1.7	0
1.7 TO 1.8	5
1.8 TO 1.9	2
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	2
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	2
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: CITY - Midnight (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.50 σ

Mean = 275.00 Kelvin

Std. Dev. = σ = 0.28 Kelvin

EQUIVALENT ELLIPTICAL AREAS

3.5-74

CITY - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 9.0 - 11.4 μm

Mean = 275.00 Kelvin

σ = 0.28 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	22
10.0 TO	15.0	32
15.0 TO	20.0	16
20.0 TO	25.0	9
25.0 TO	30.0	6
30.0 TO	35.0	11
35.0 TO	40.0	4
40.0 TO	45.0	3
45.0 TO	50.0	7
50.0 TO	75.0	5
75.0 TO	100.0	4
100.0 TO	150.0	1
150.0 TO	200.0	2
200.0 TO	250.0	2
250.0 TO	300.0	2
300.0 TO	400.0	0
400.0 TO	500.0	1
OVER	500.0	5

TOTAL NUMBER OF ELLIPTICAL AREAS = 132

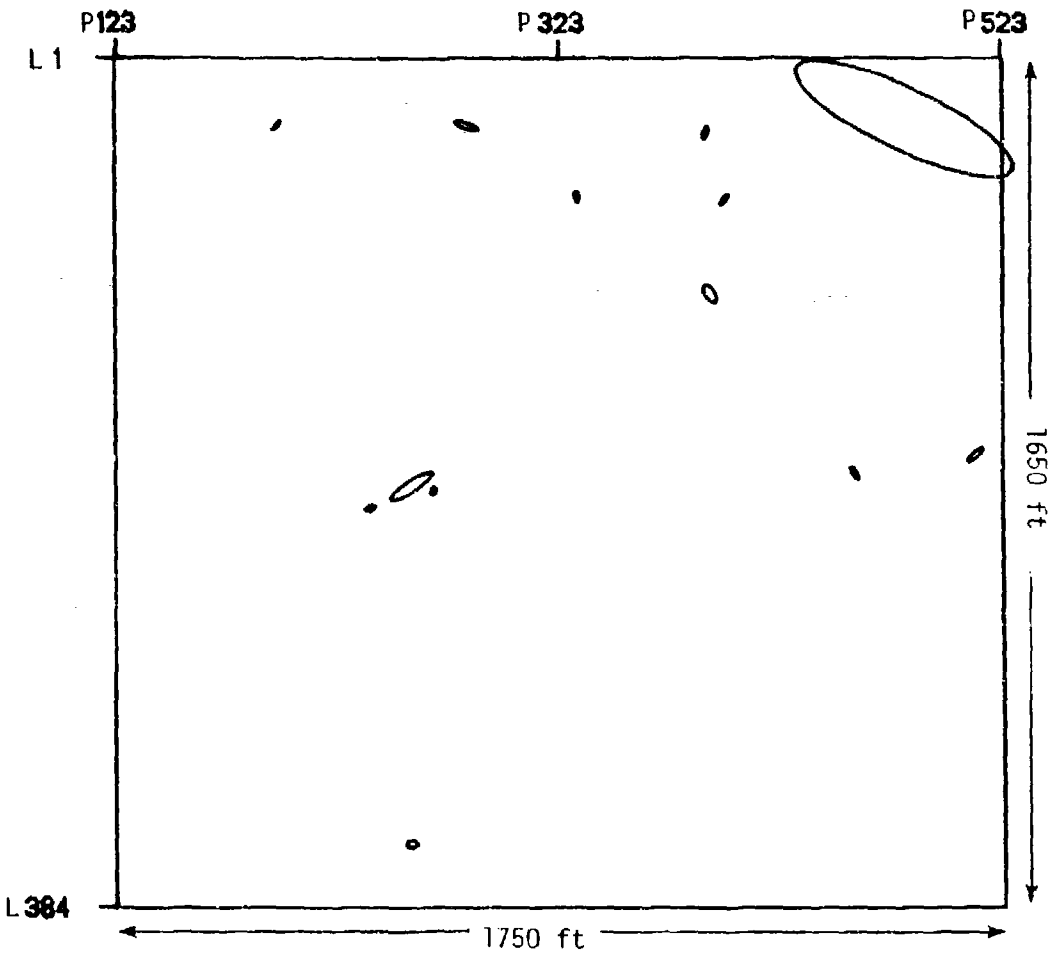
354 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	11
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	8
17 TO 20	55 TO 65	13
20 TO 22	65 TO 72	15
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	5
26 TO 28	85 TO 91	9
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	21
39 TO 45	127 TO 147	6
45 TO 55	147 TO 180	13
55 TO 71	180 TO 232	12
71 TO 100	232 TO 328	3
OVER 100	OVER 328	12

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	12
1.3 TO 1.4	9
1.4 TO 1.5	4
1.5 TO 1.6	10
1.6 TO 1.7	9
1.7 TO 1.8	15
1.8 TO 1.9	11
1.9 TO 2.0	2
2.0 TO 2.4	36
2.4 TO 2.6	6
2.6 TO 2.8	4
2.8 TO 3.0	3
3.0 TO 3.5	4
3.5 TO 4.0	2
4.0 TO 4.5	1
OVER 4.5	4



Area: CITY - Midnight (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 275.00 Kelvin

Std. Dev. = σ = 0.28 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

CITY - MIDNIGHT
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ
Wavelength = 9.0 - 11.4 μm
Mean = 275.00 Kelvin
σ = 0.28 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	1
10.0 TO	15.0	4
15.0 TO	20.0	2
20.0 TO	25.0	1
25.0 TO	30.0	0
30.0 TO	35.0	1
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	1
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 13

37 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	1
17 TO	20	55 TO	65	4
20 TO	22	65 TO	72	2
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	0
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	2
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	1
55 TO	71	180 TO	232	0
71 TO	100	232 TO	328	0
OVER	100	OVER	328	2

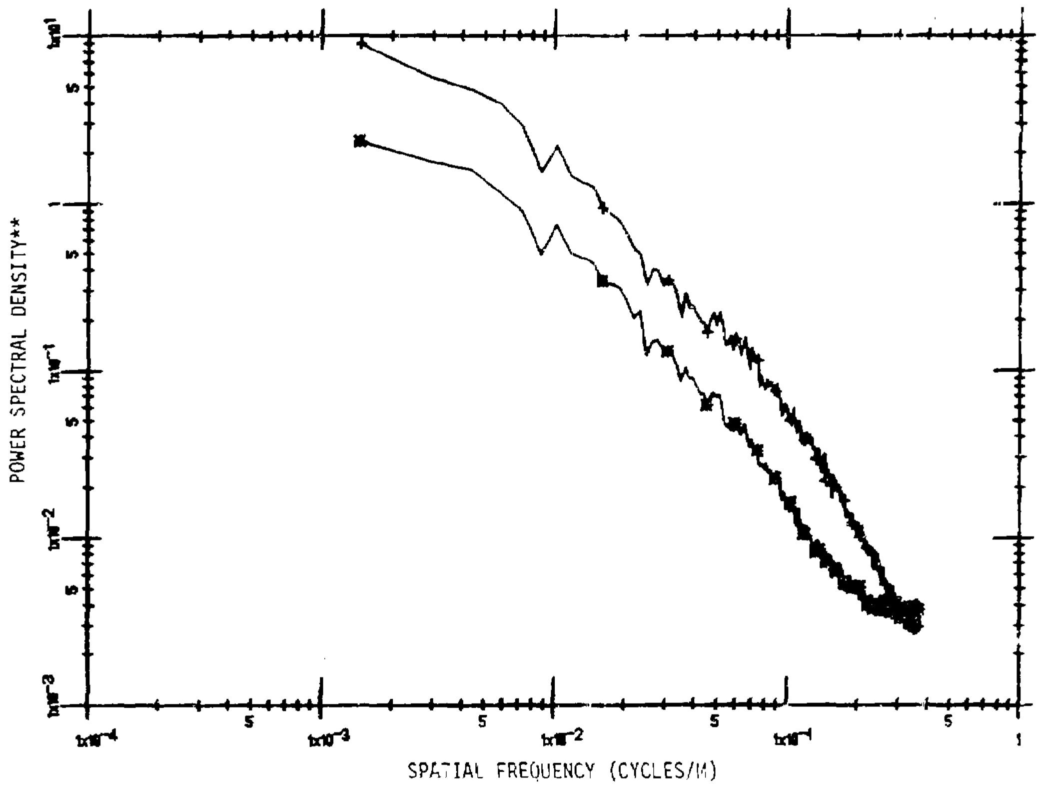
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	1
1.3 TO 1.4	1
1.4 TO 1.5	0
1.5 TO 1.6	2
1.6 TO 1.7	1
1.7 TO 1.8	3
1.8 TO 1.9	0
1.9 TO 2.0	2
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

MICHIGAN WINTER SCENE - CITY

Power Spectra

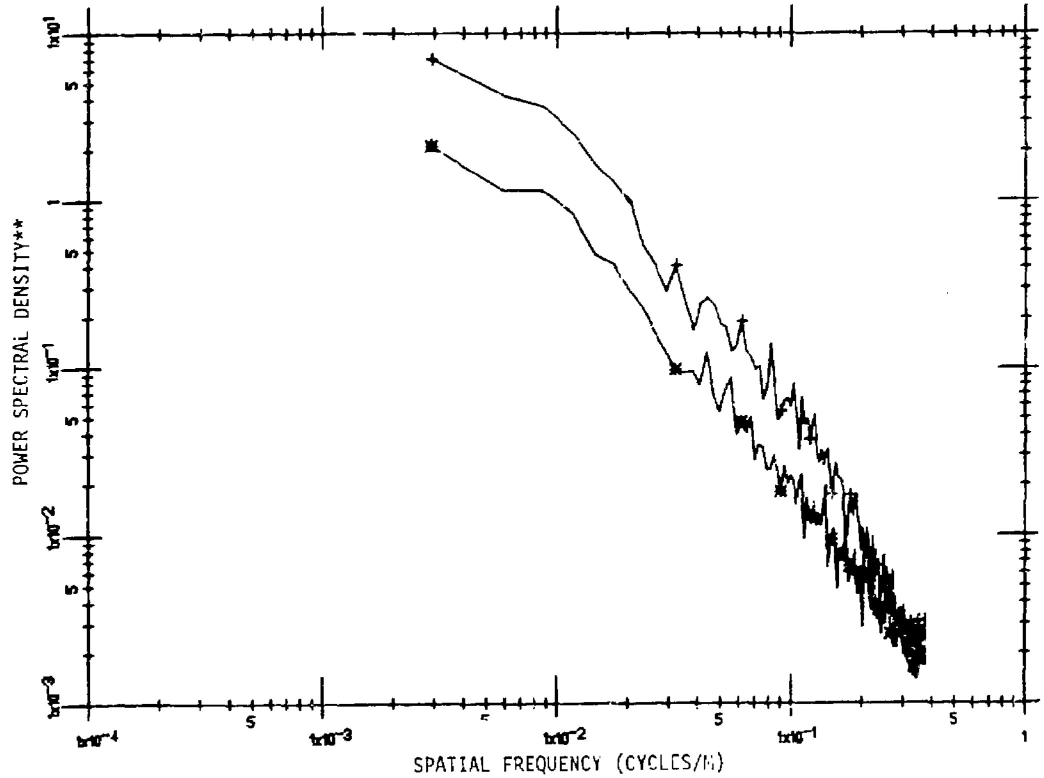
Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - CROSS-TRACK

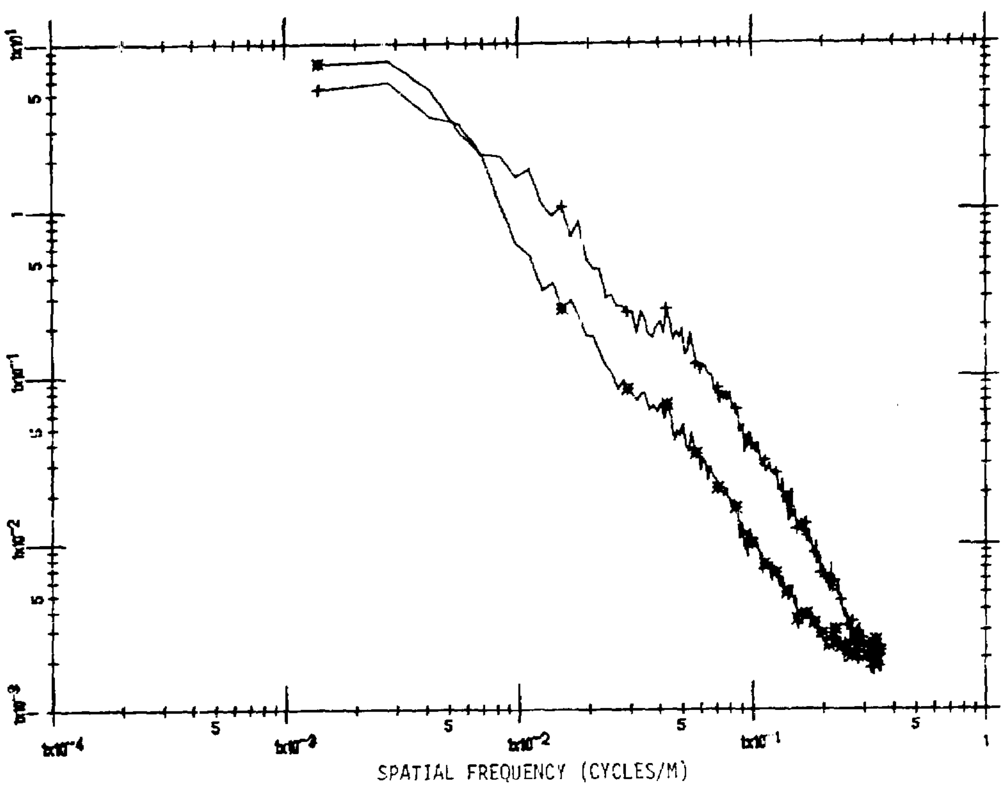
** *Power Spectral Density is* $(°K)^2$*/cycle/meter for*
4.5 to 5.5 μm and 9.0 to 11.4 um bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - IN-TRACK

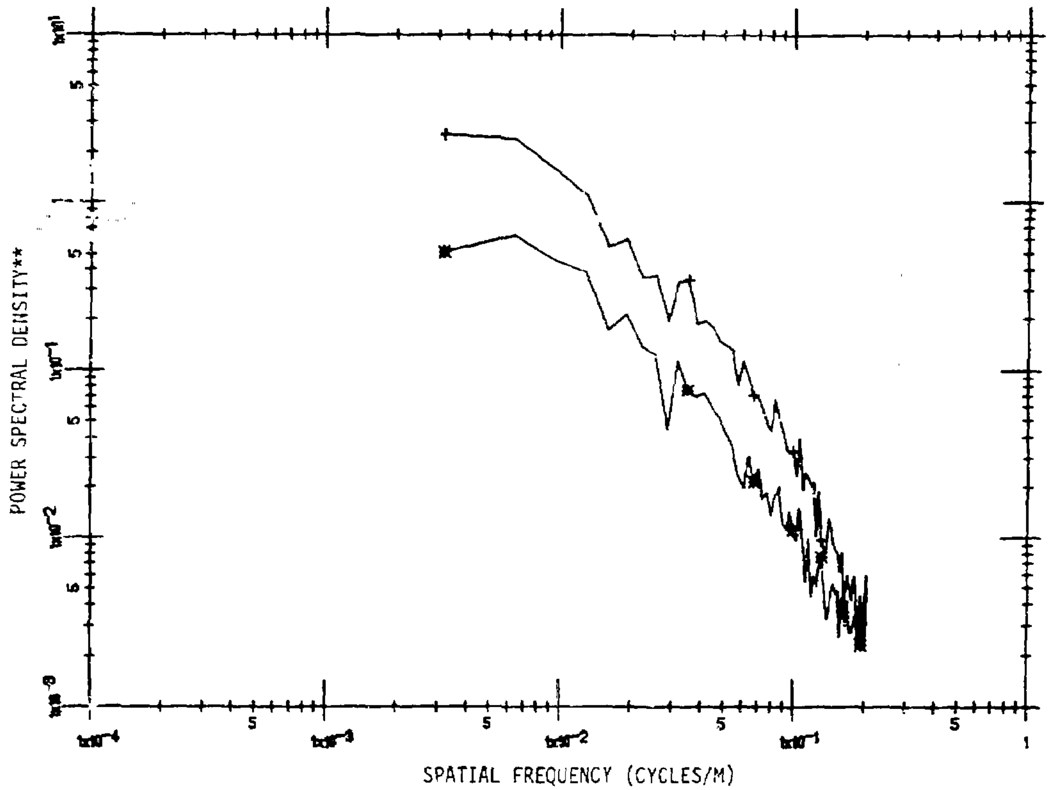
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - CROSS-TRACK

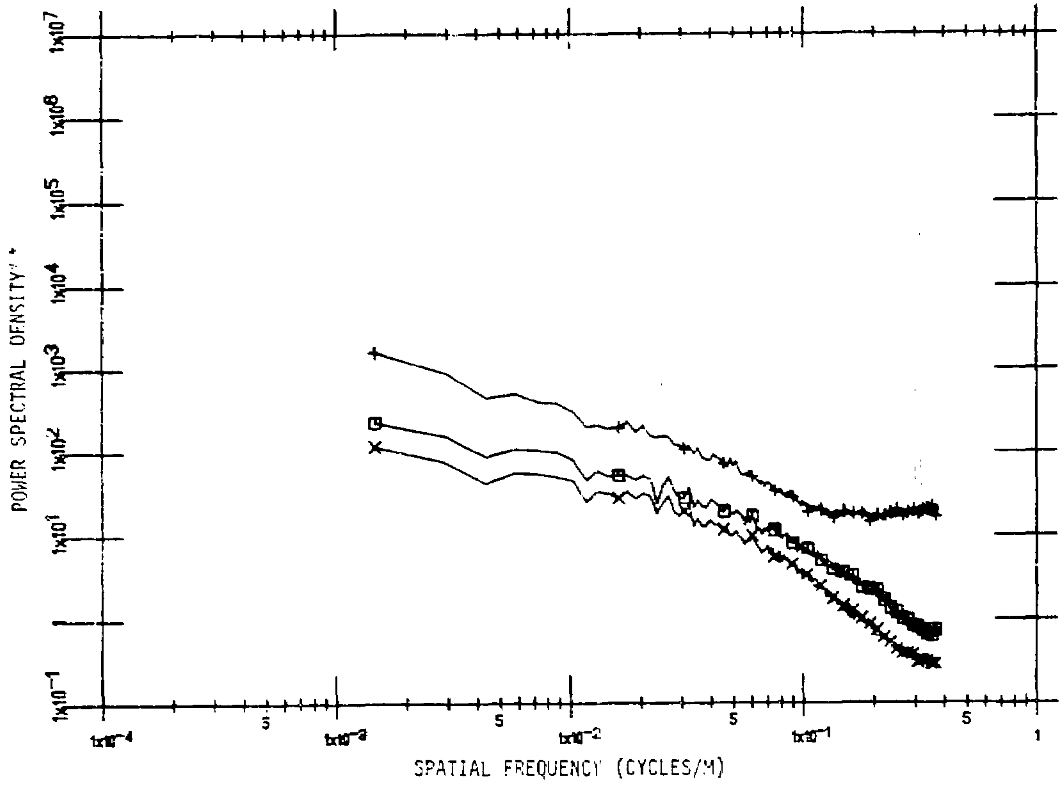
** P. er Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - IN-TRACK

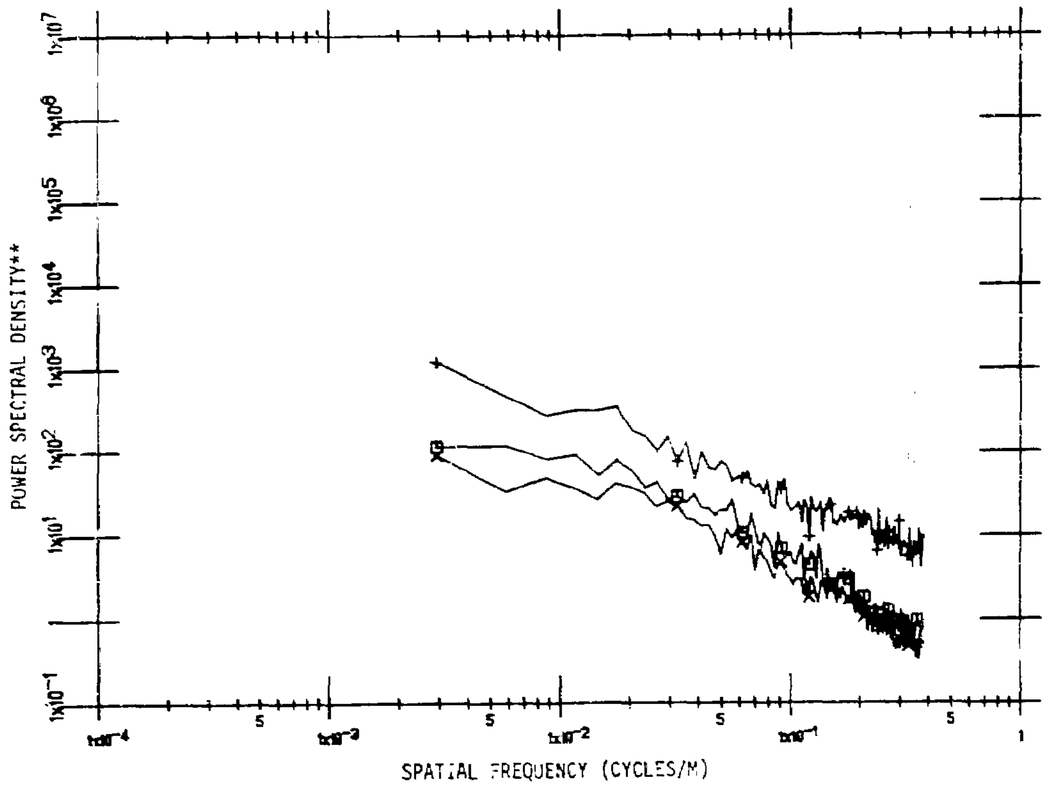
** Power Spectral Density is $(°K)^2$/cycle/meter for
4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - CROSS-TRACK

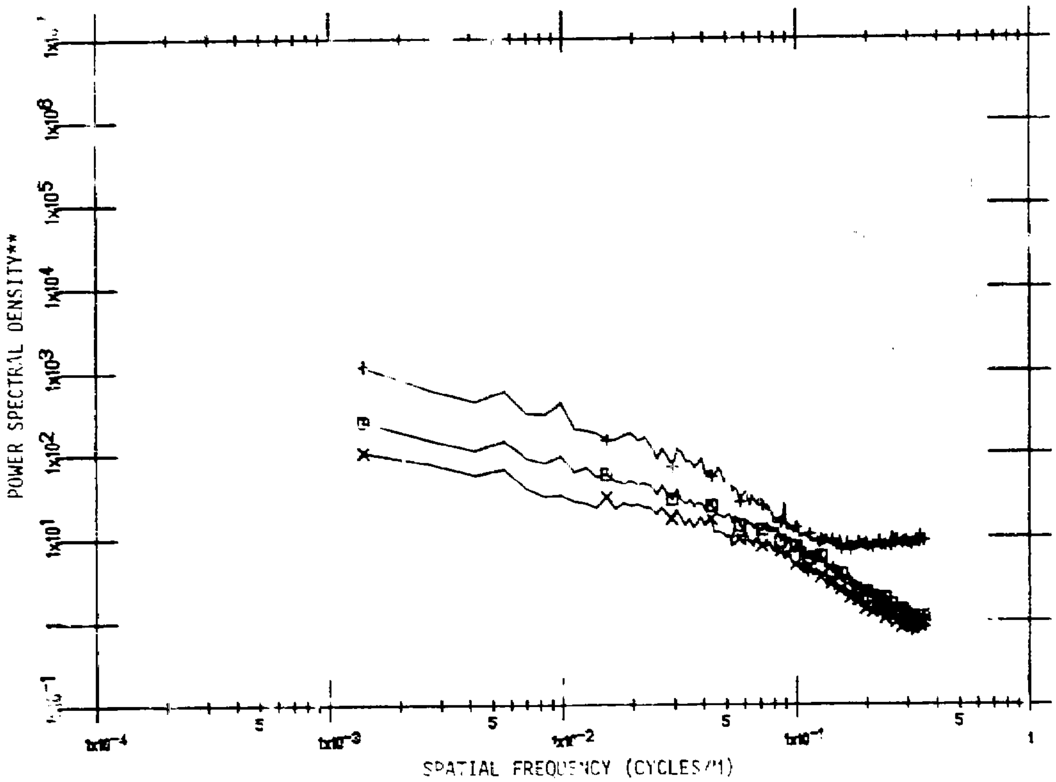
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 um, 4.5 to 5.5 um and 9.0 to 11.4 um bands.



Area: CITY Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - IN-TRACK

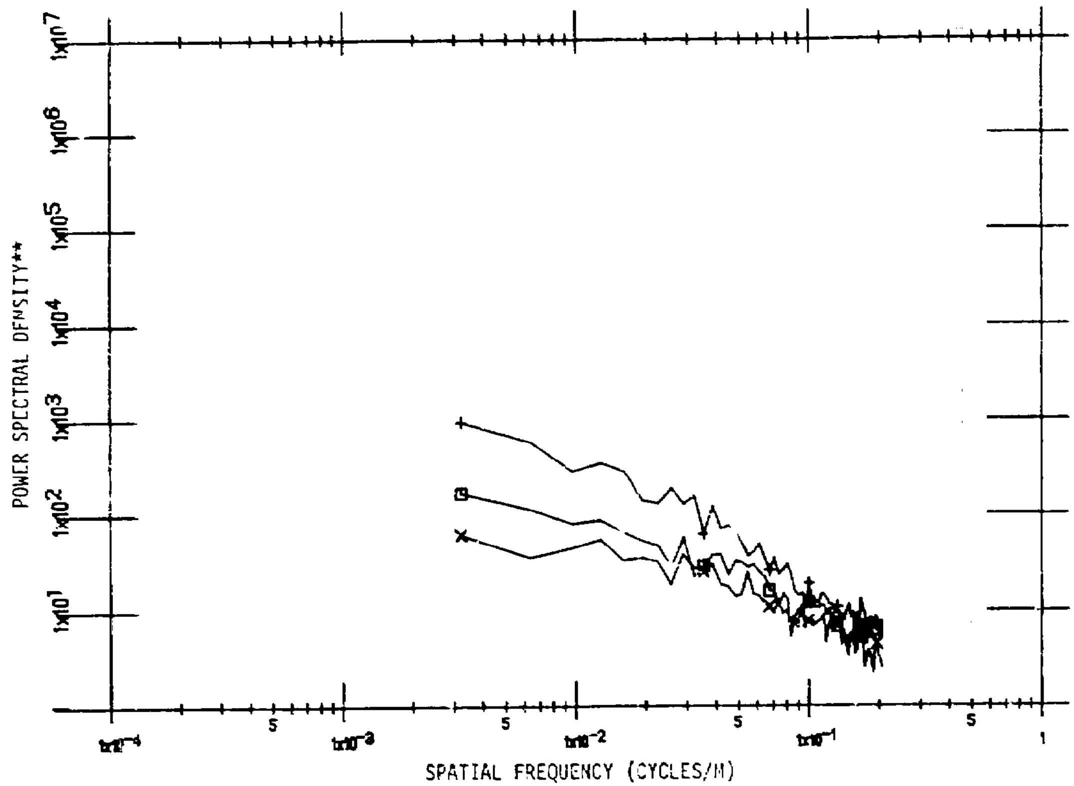
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - CROSS-TRACK

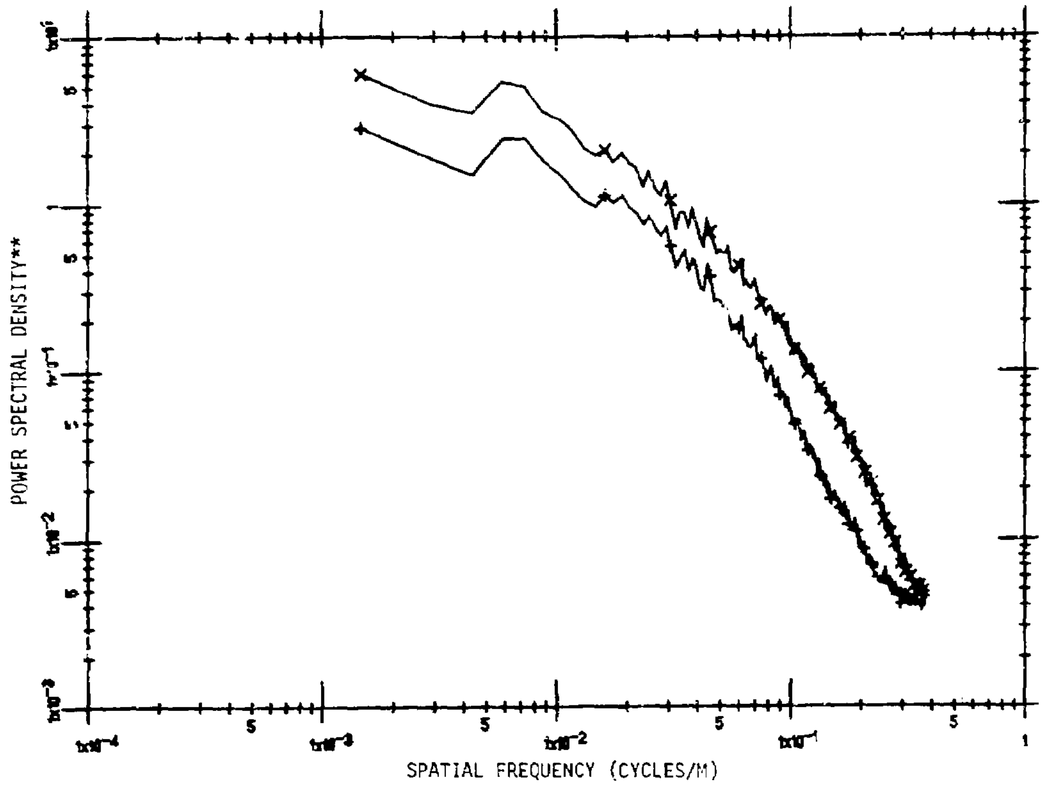
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 µm, 4.5 to 5.5 µm and 9.0 to 11.4 µm bands.



Area: CITY Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - IN-TRACK

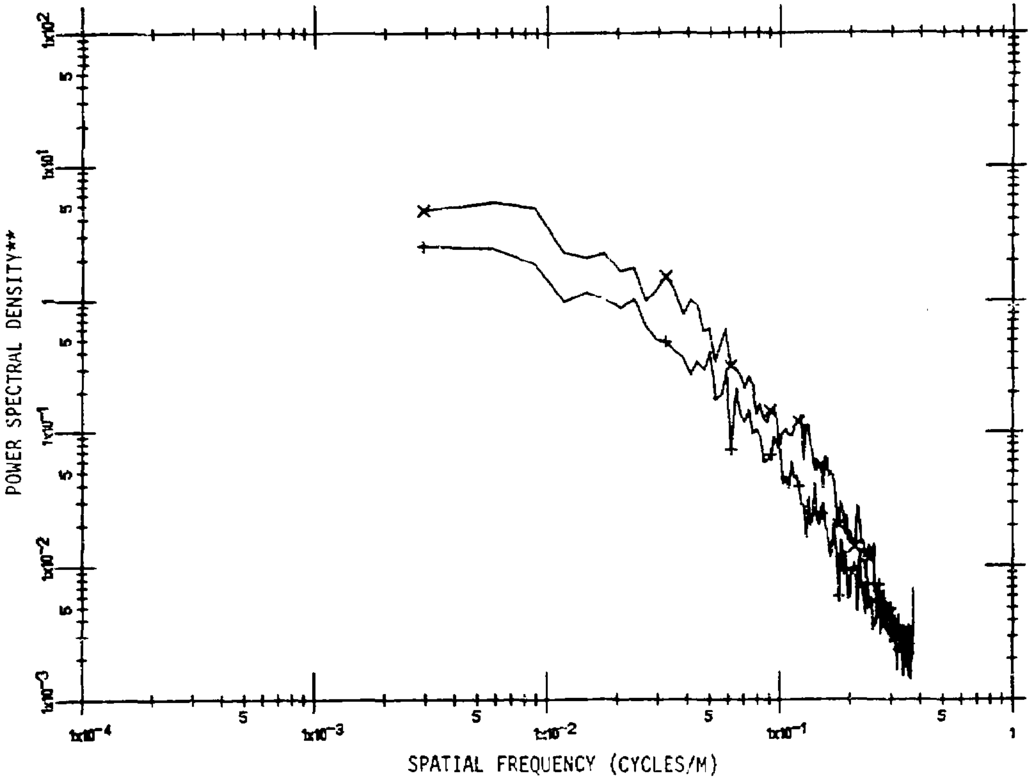
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - CROSS-TRACK

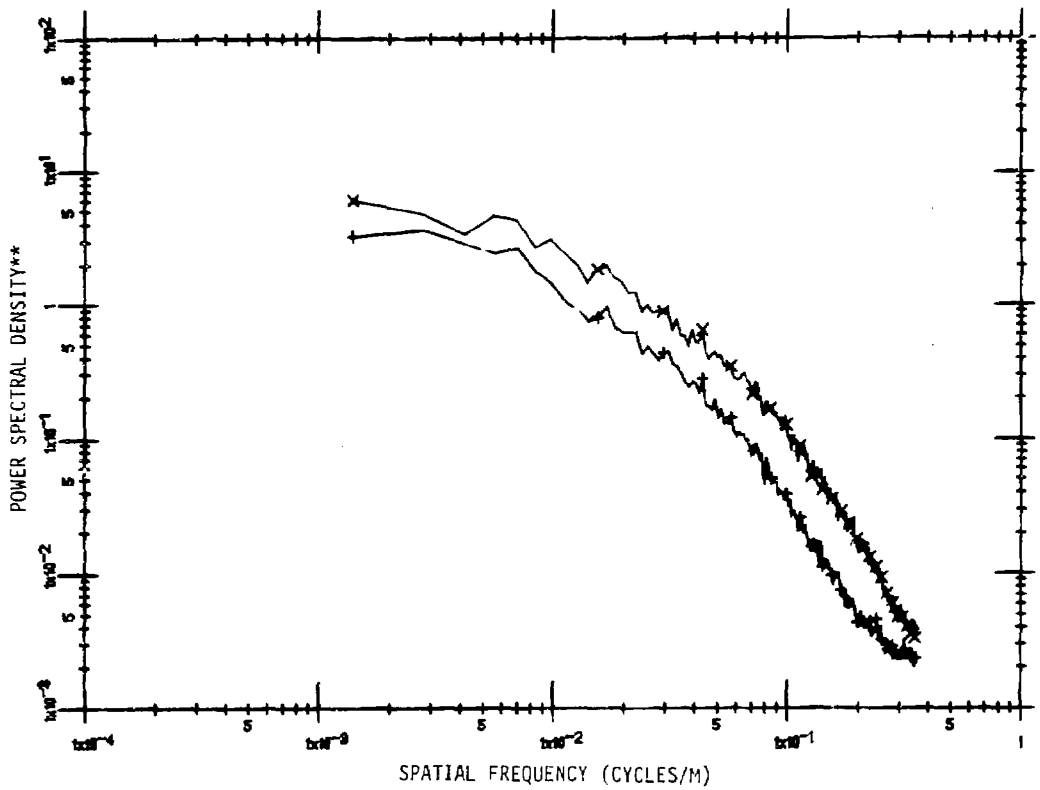
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - IN-TRACK

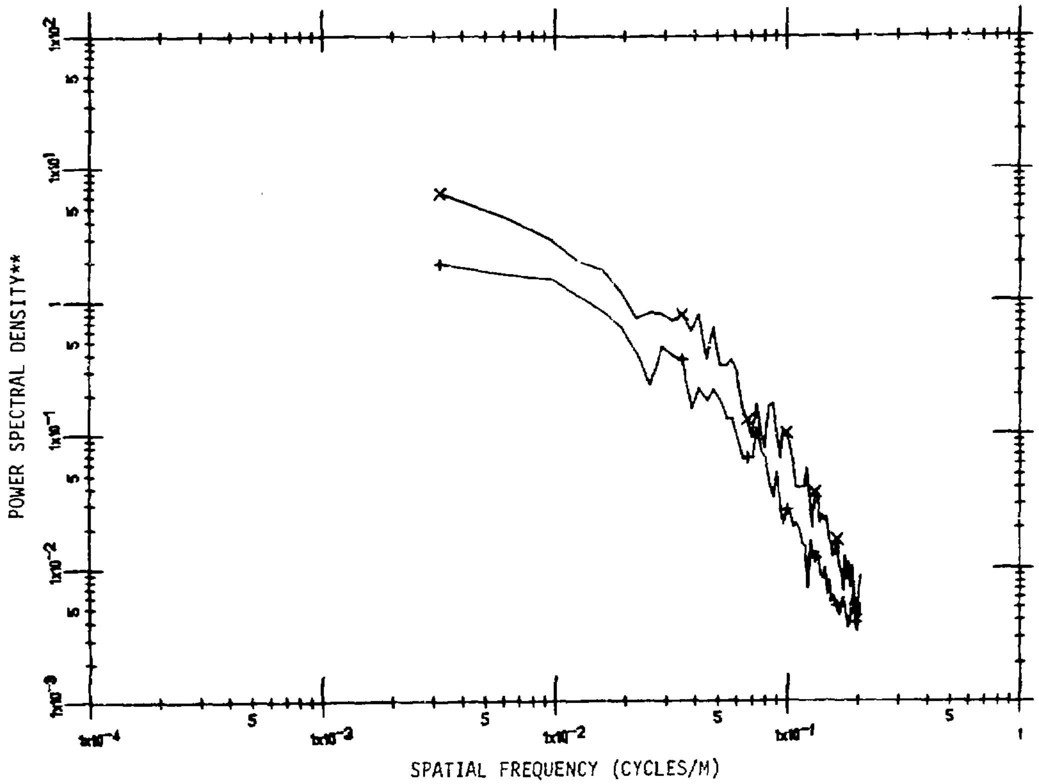
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - CROSS-TRACK

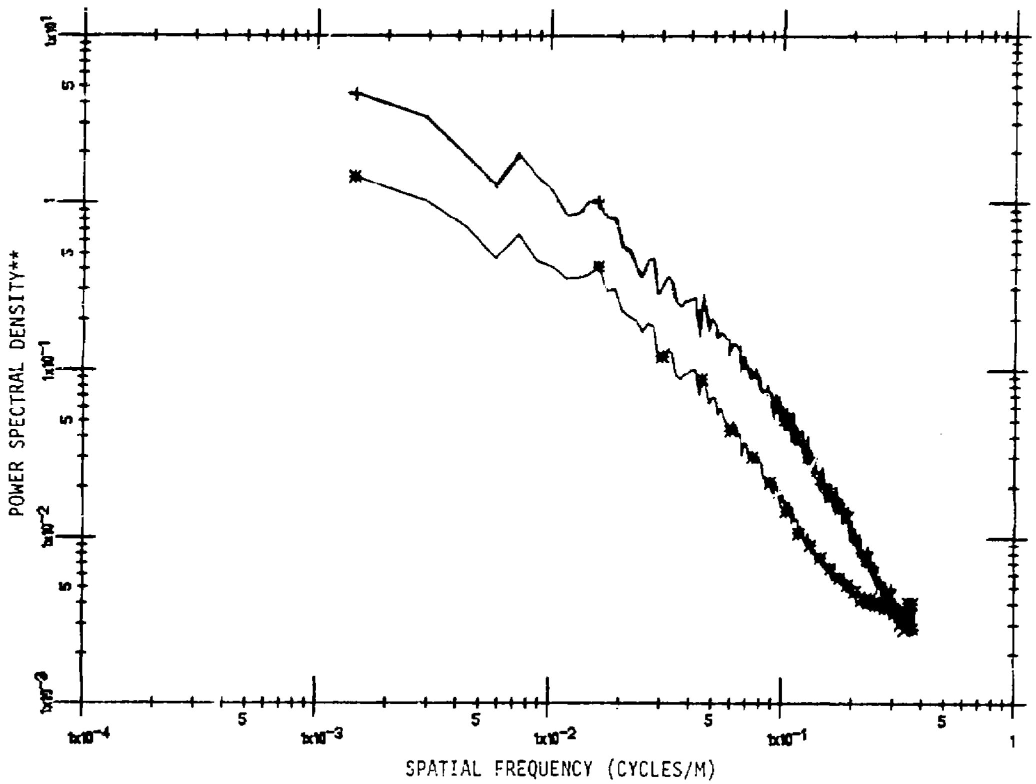
** *Power Spectral Density is* $(°K)^2$*/cycle/meter for*
4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - IN-TRACK

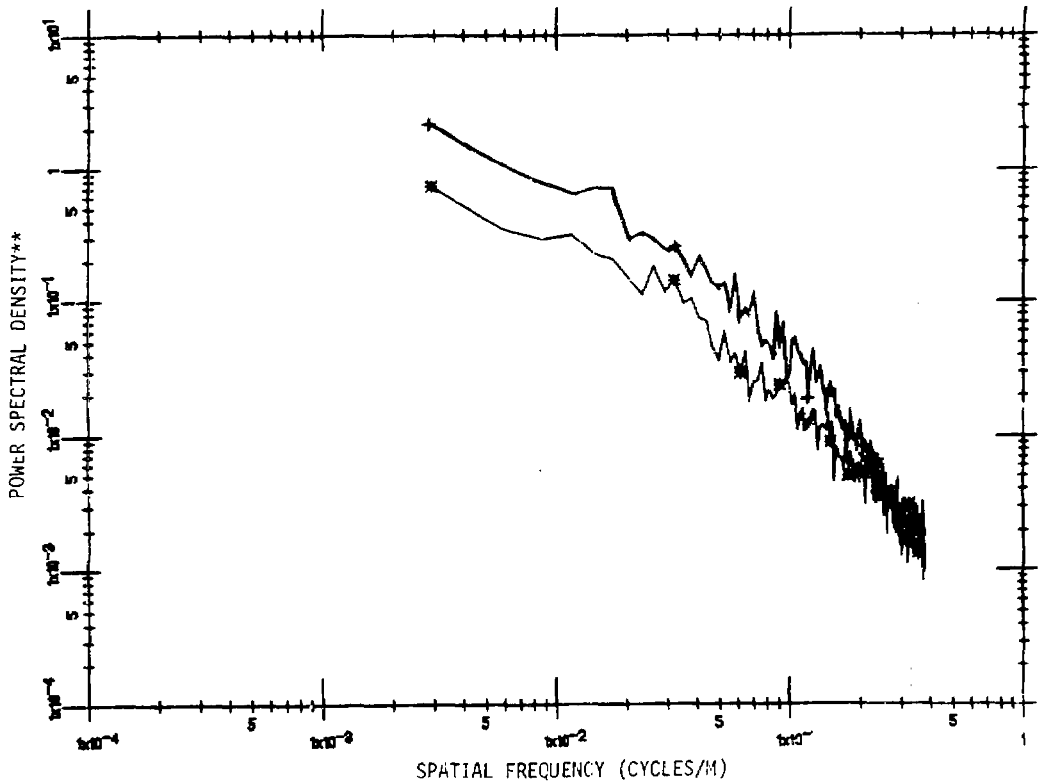
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - CROSS-TRACK

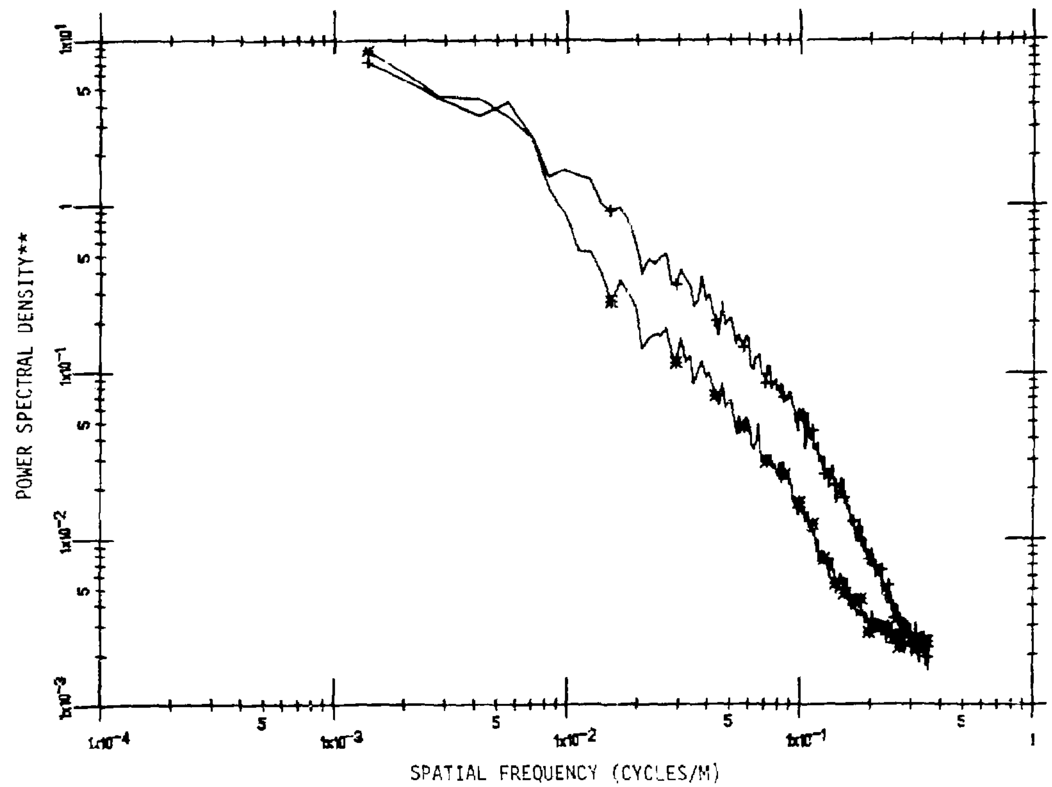
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - IN-TRACK

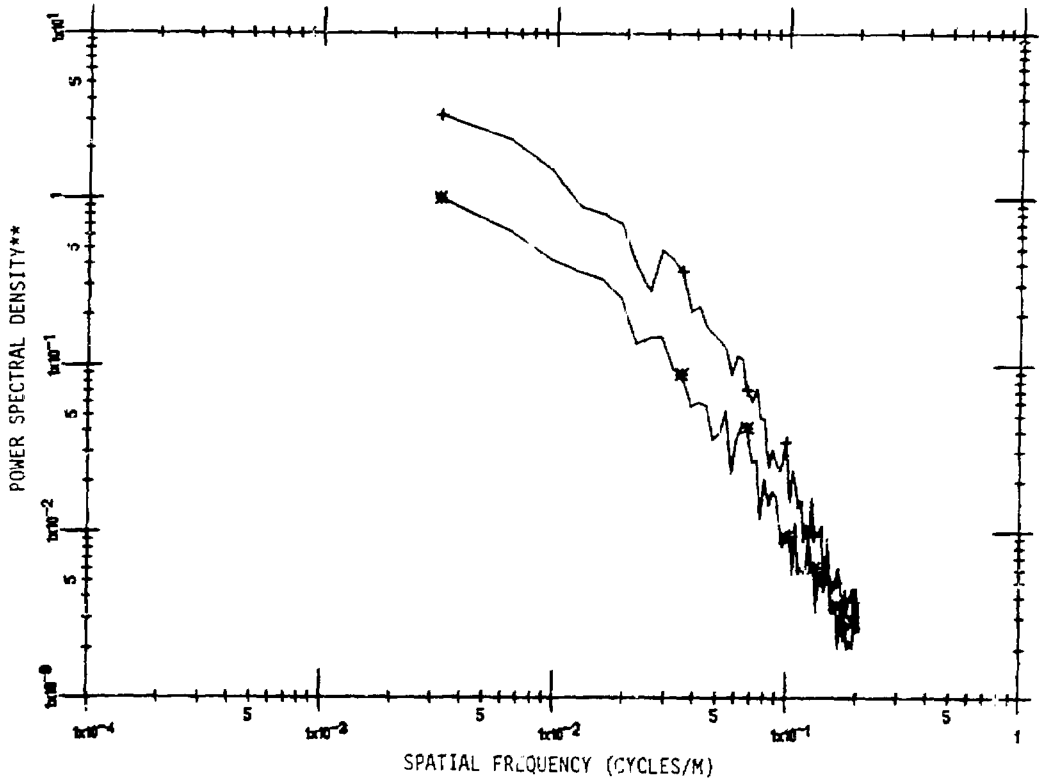
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - CROSS-TRACK

** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: CITY Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - IN-TRACK

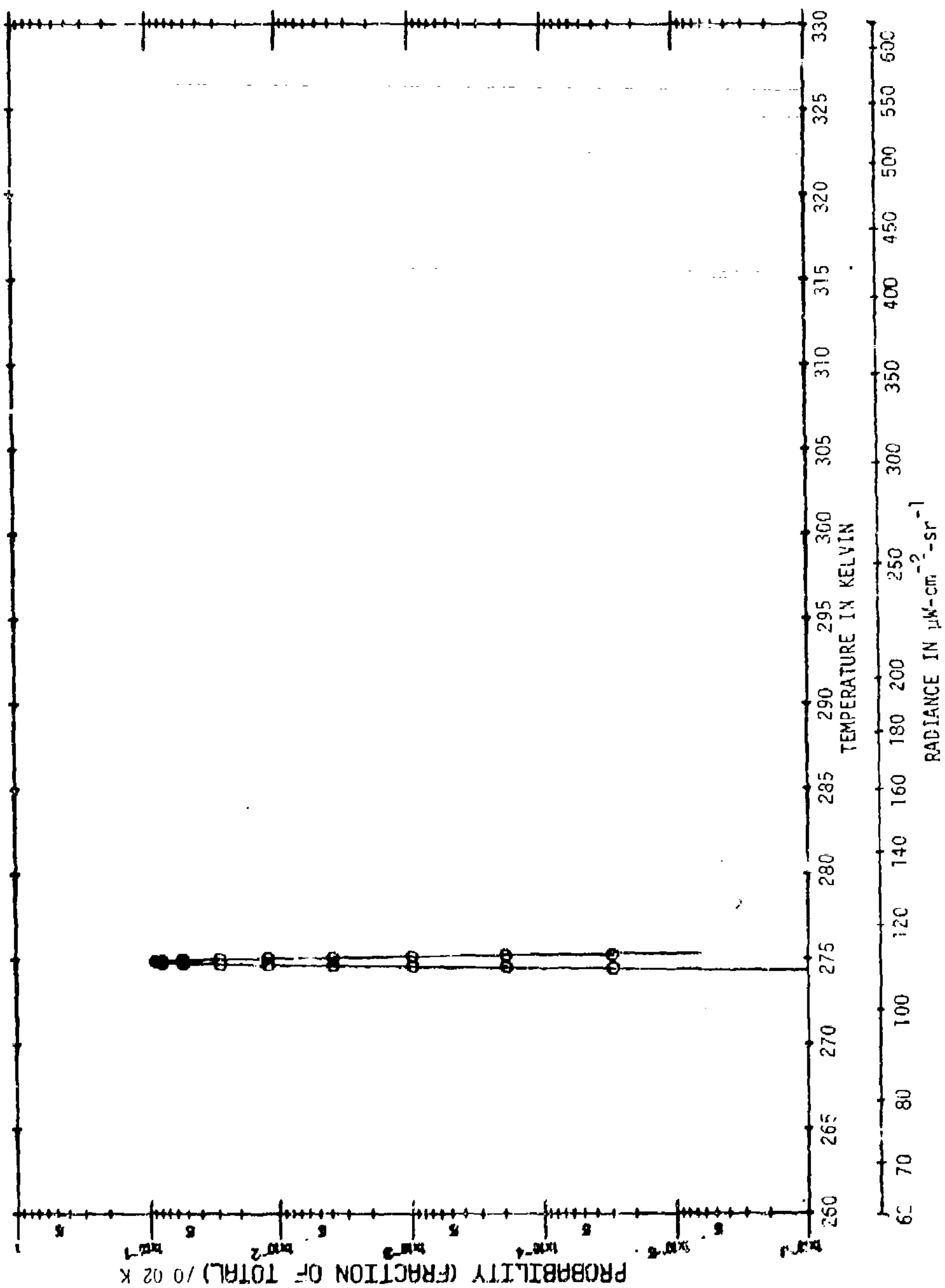
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.

MICHIGAN WINTER SCENE - CONIFERS

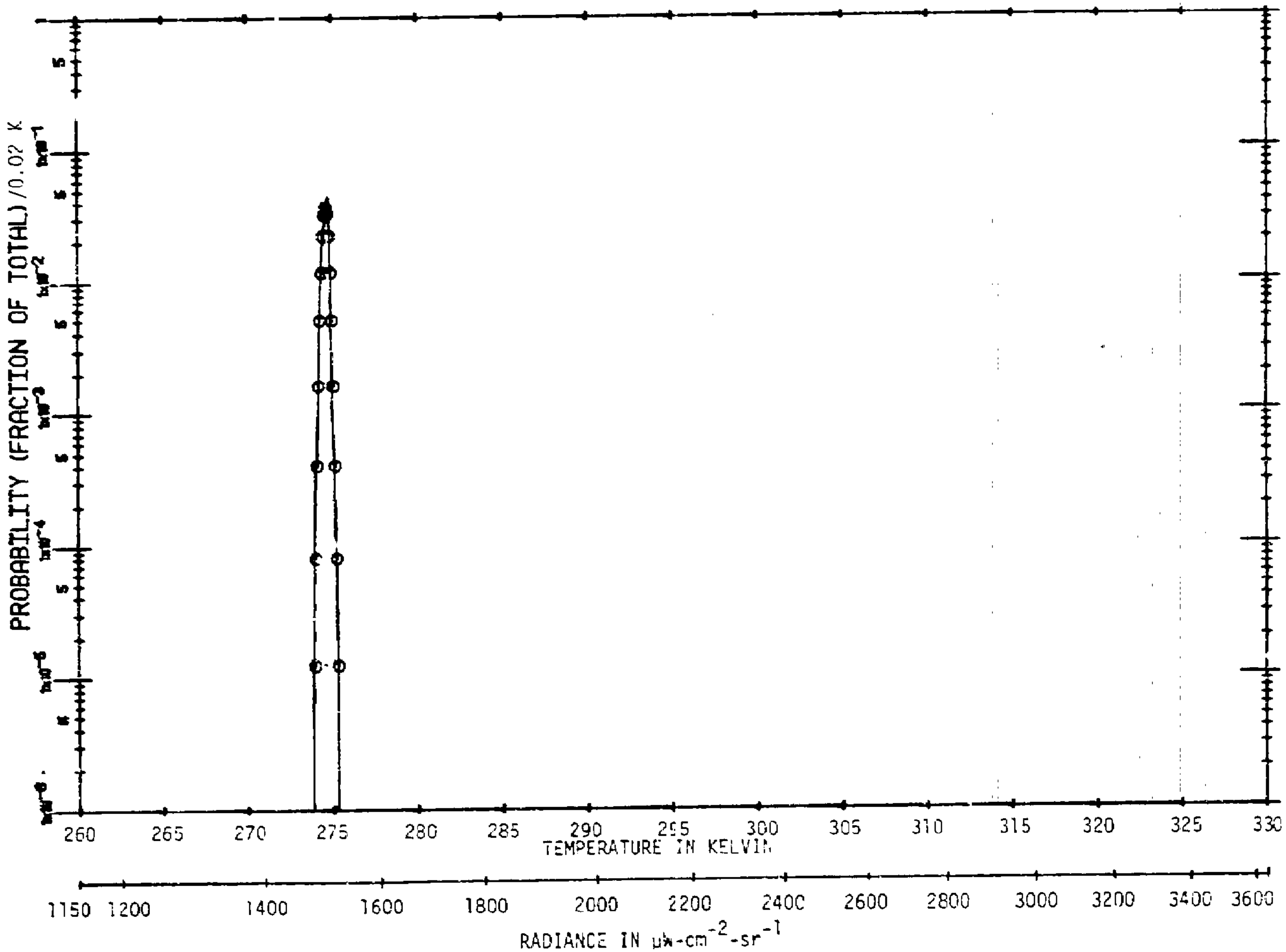
Histograms*

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

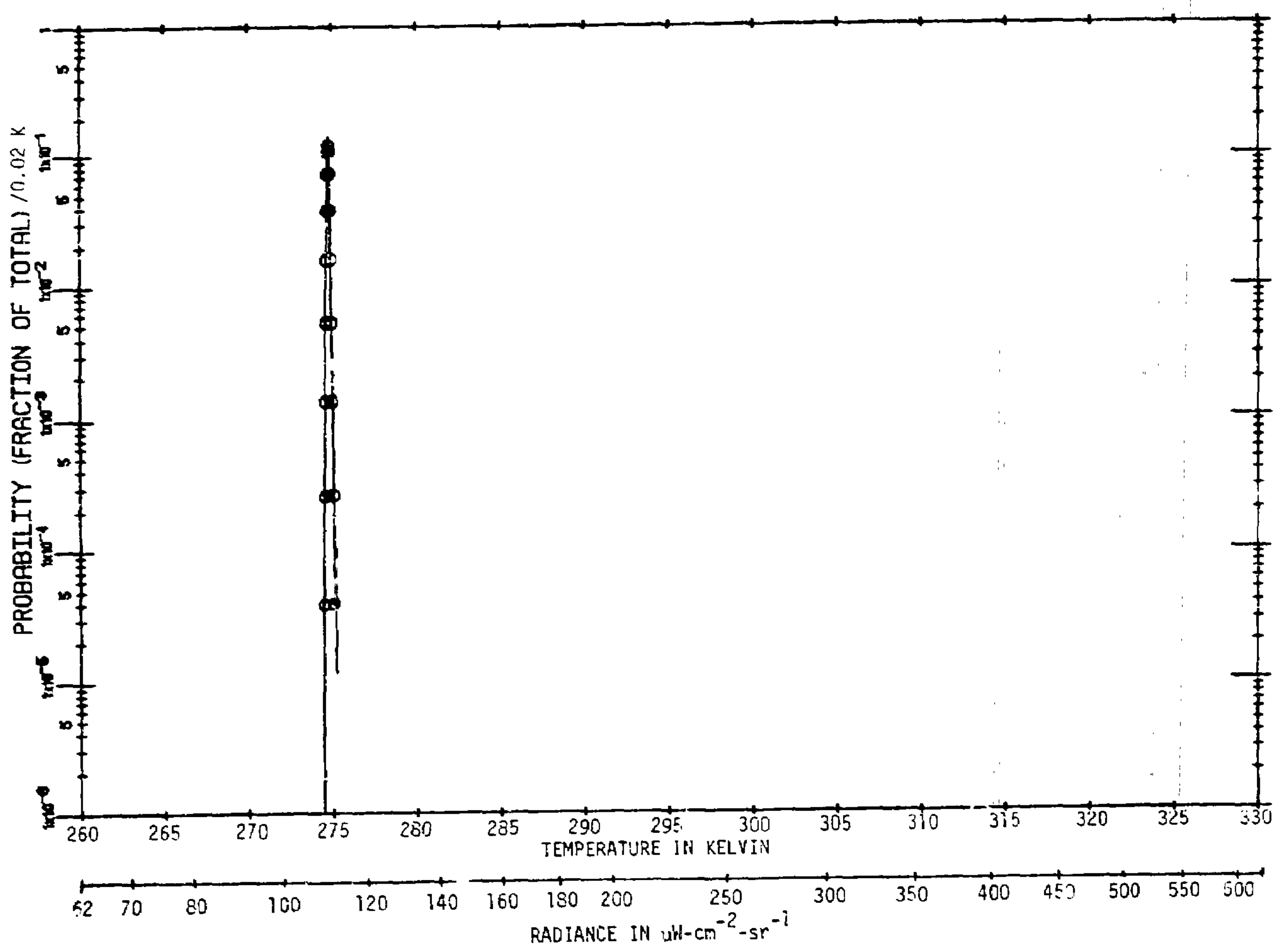
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data proc ssing.



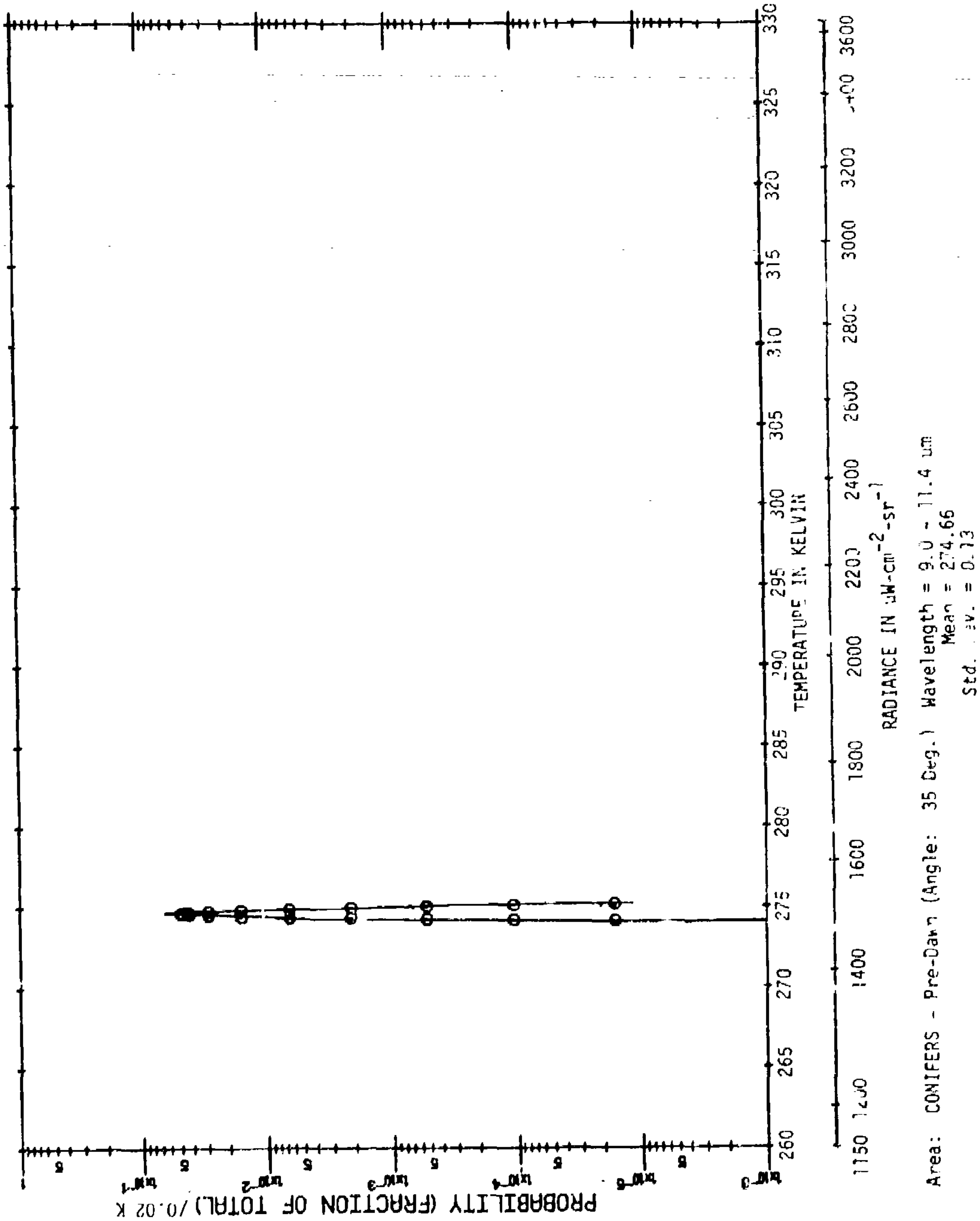
Area: CONIFERS - Pre-Dawn (Angle: 90 Deg) Wavelength = 4.5 - 5.5 µm
Mean = 274.86
Std. Dev. = 0.10



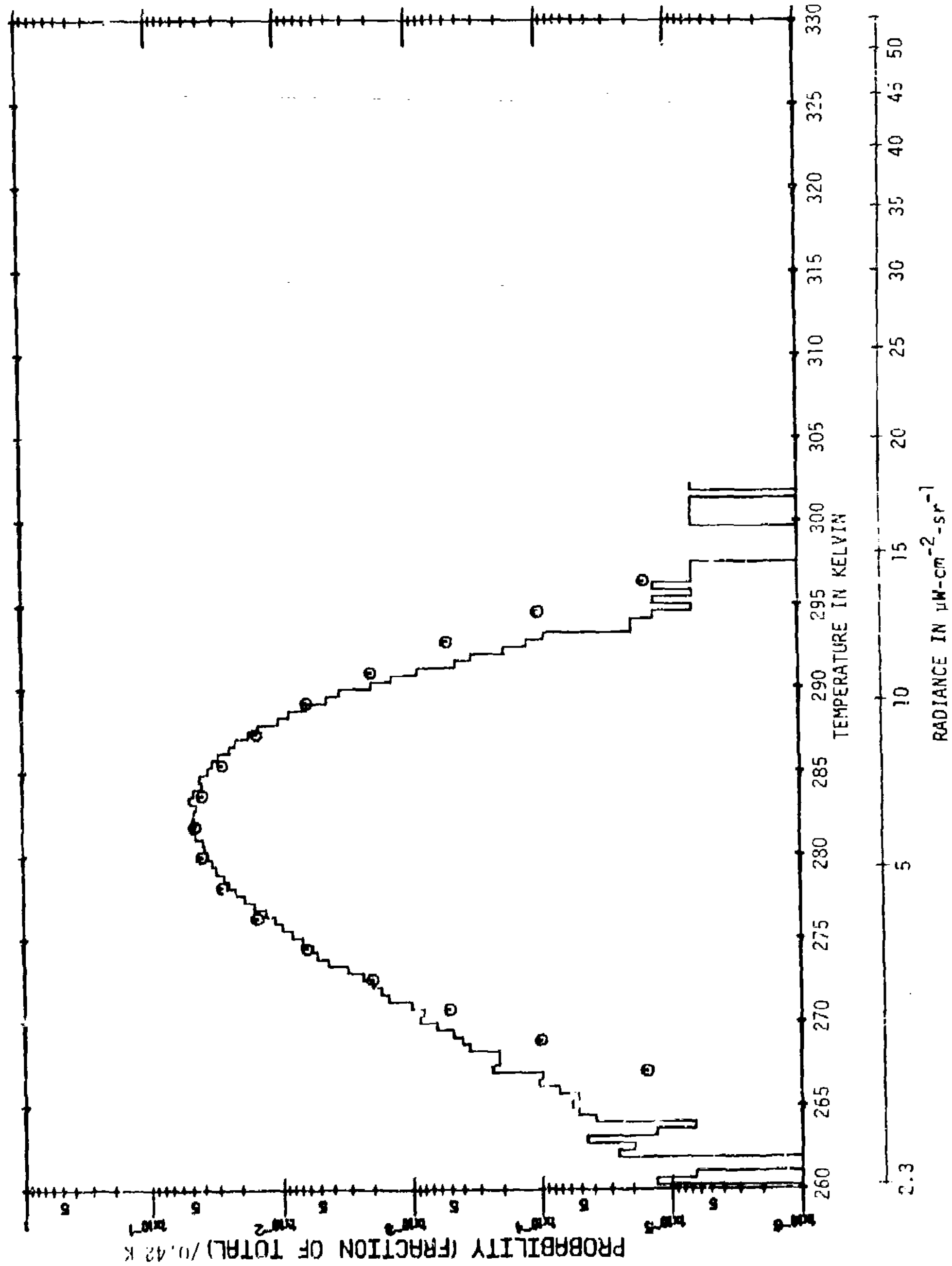
Area: CONIFERS - Pre-Dawn (Angle: 90 Deg.) Wavelength = 9.0 - 11.4 μm
Mean = 274.66
Std. Dev. = 0.18



Area: CONIFERS - Pre-Dawn (Angle: 35 Deg.) Wavelength = 4.5 - 5.5 um
Mean = 274.83
Std. Dev. 0.07

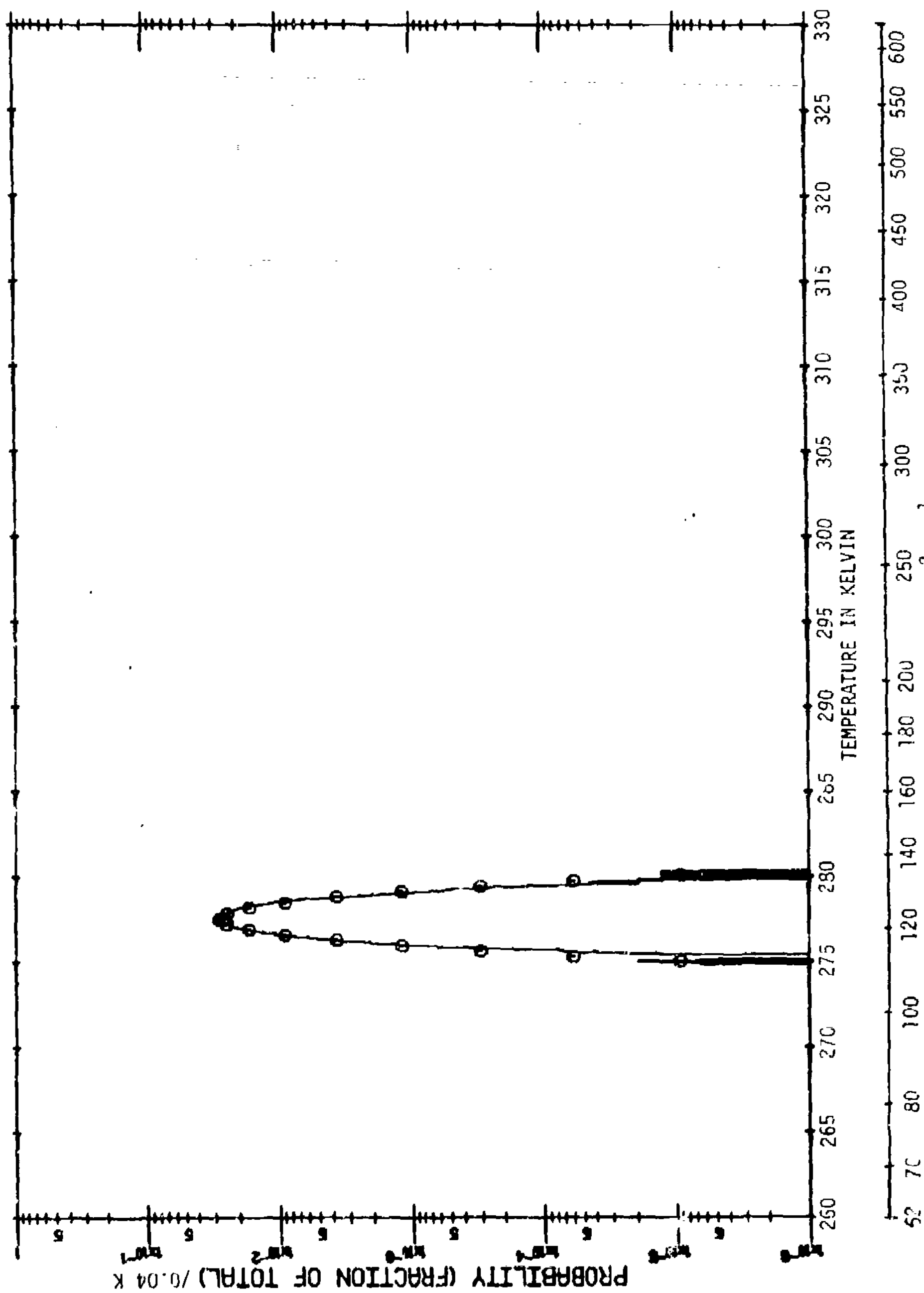


TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
1150 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600
PROBABILITY (FRACTION OF TOTAL)/0.02 K
Area: CONIFERS - Pre-Dawn (Angle: 35 Deg.) Wavelength = 9.0 - 11.4 um
Mean = 274.66
Std. Dev. = 0.13

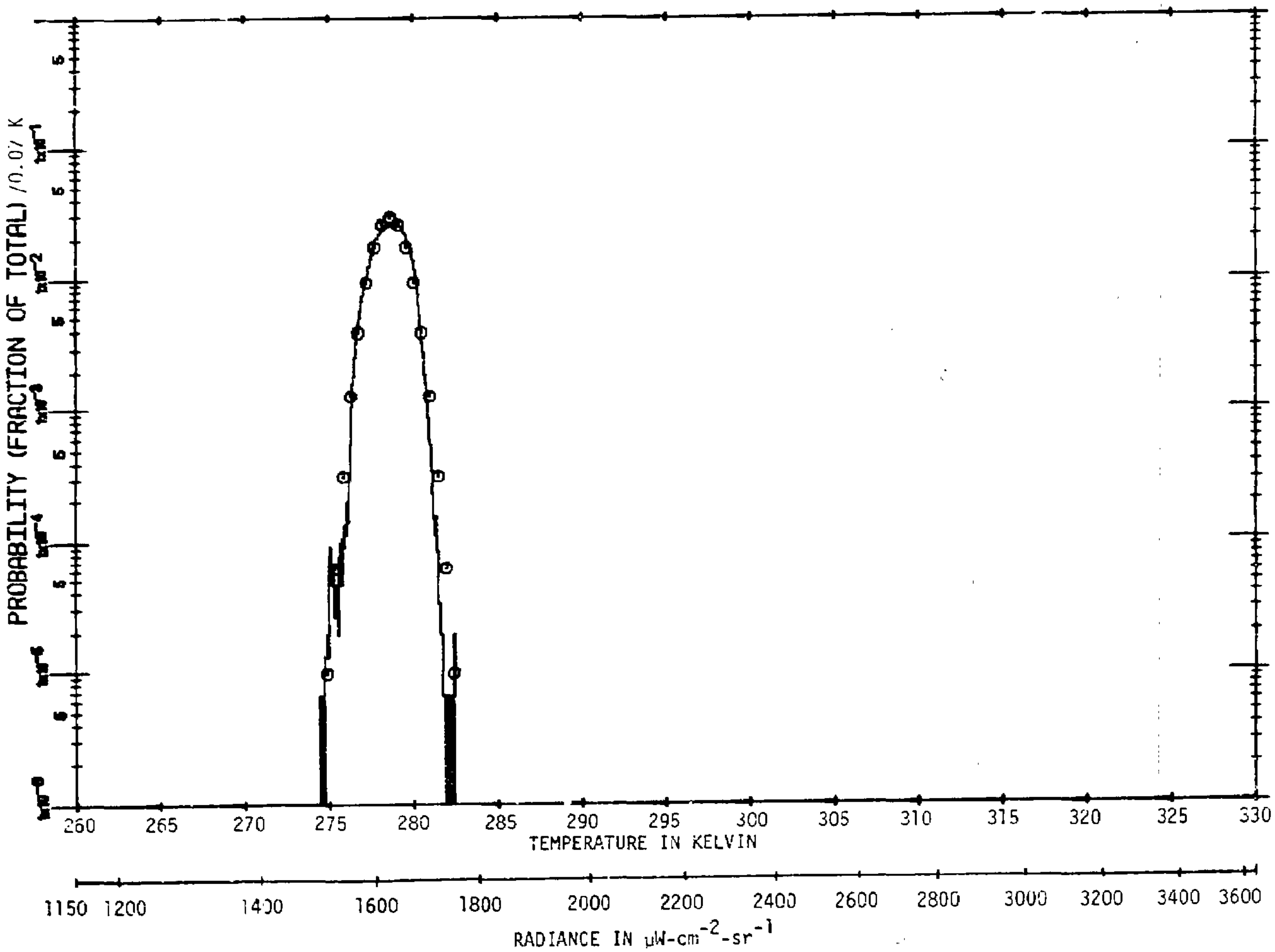


Area: CONIFERS - Noor (Angle: 90 Deg.) Wavelength = 3.5 - 3.9 μm
Mean = 281.77
Std. Dev. = 3.67

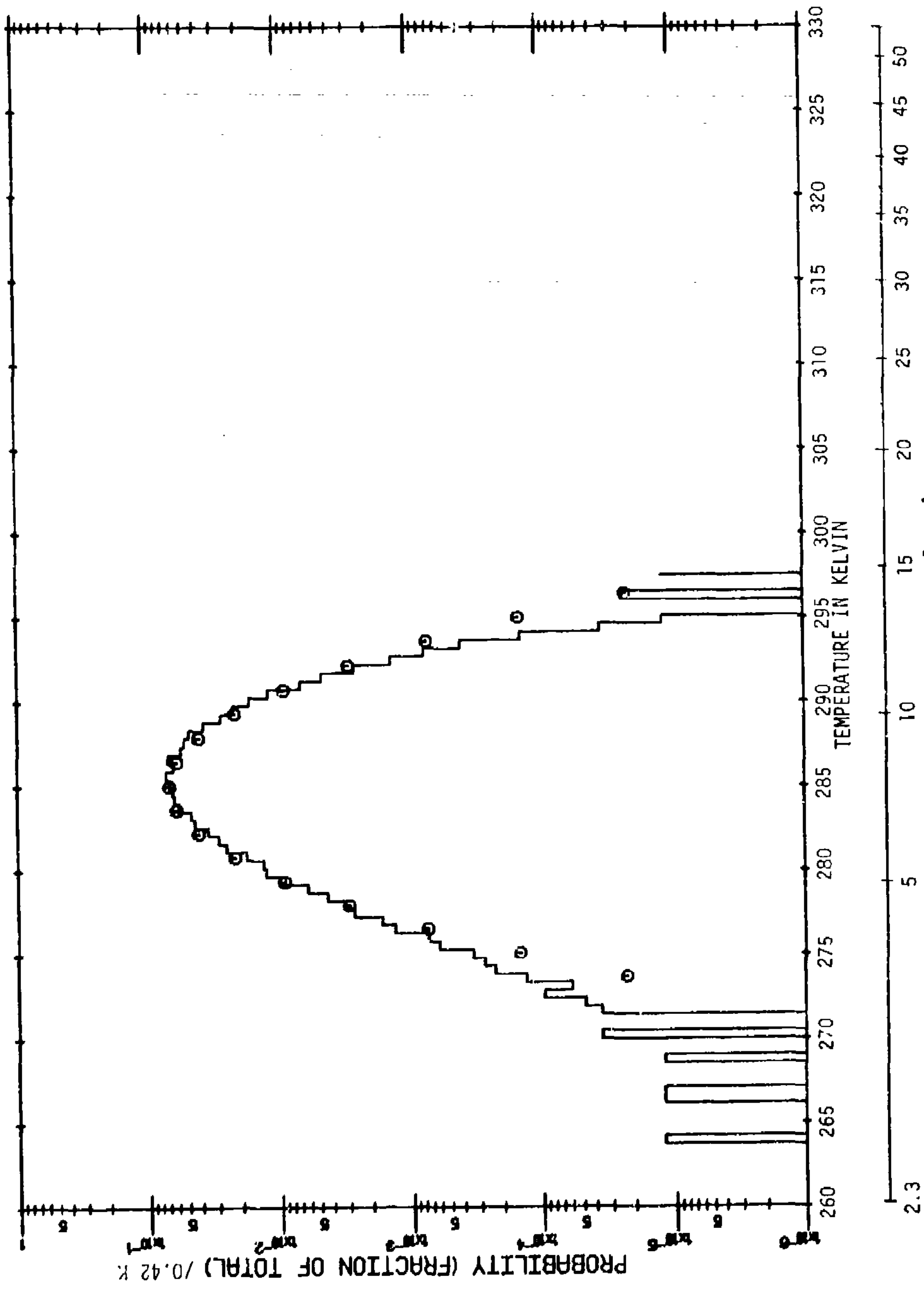
ERIM



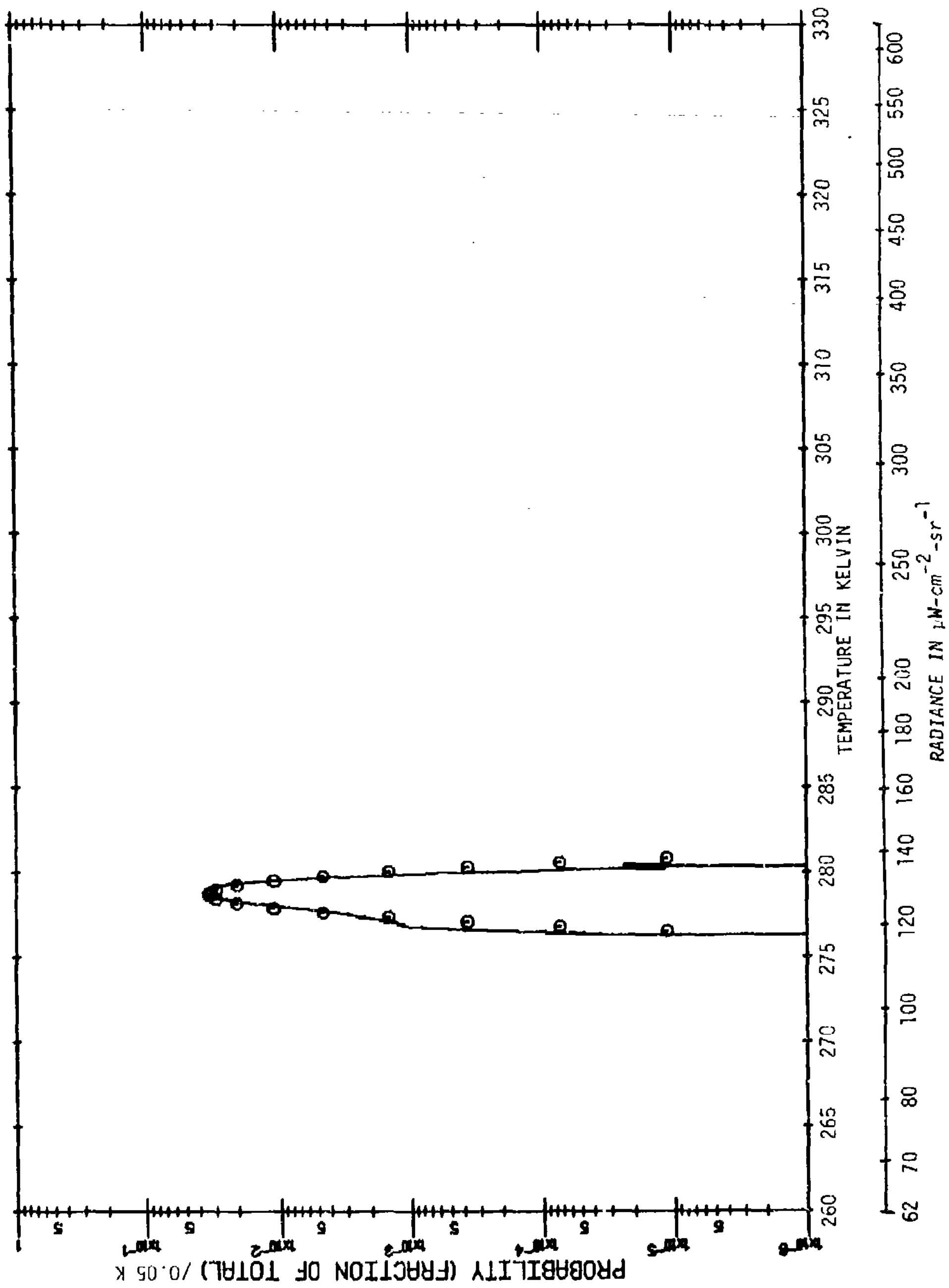
Area: CONIFERS - Noon (Angle: 90 Deg.) Wavelength = 4.5 - 5.5 μm
Mean = 277.58
Std. Dev. = 0.63



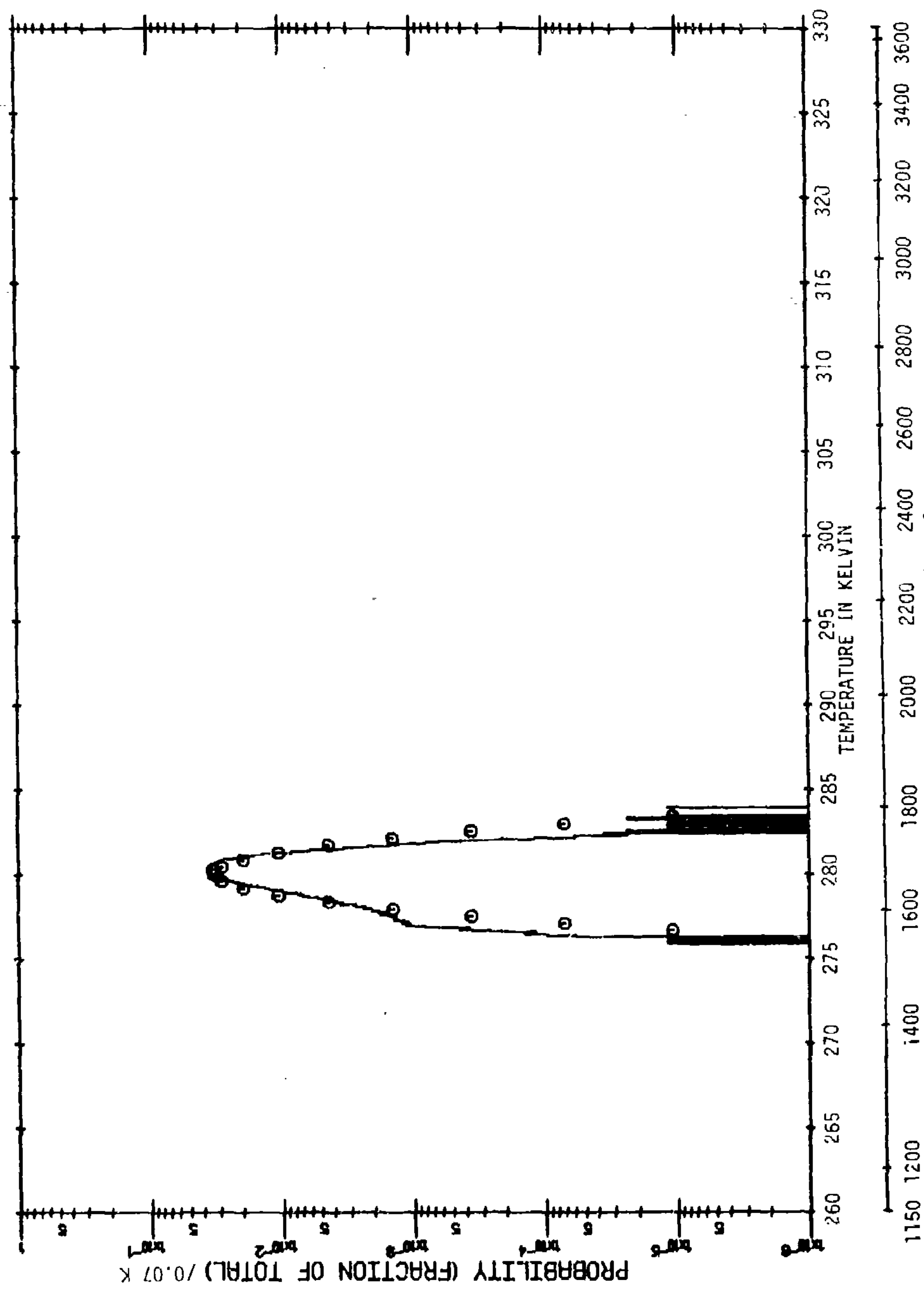
Area: CONIFERS - Noon (Angle: 90 Deg.) Wavelength = 9.0 - 11.4 μm
Mean = 273.68
Std. Dev. = 0.94



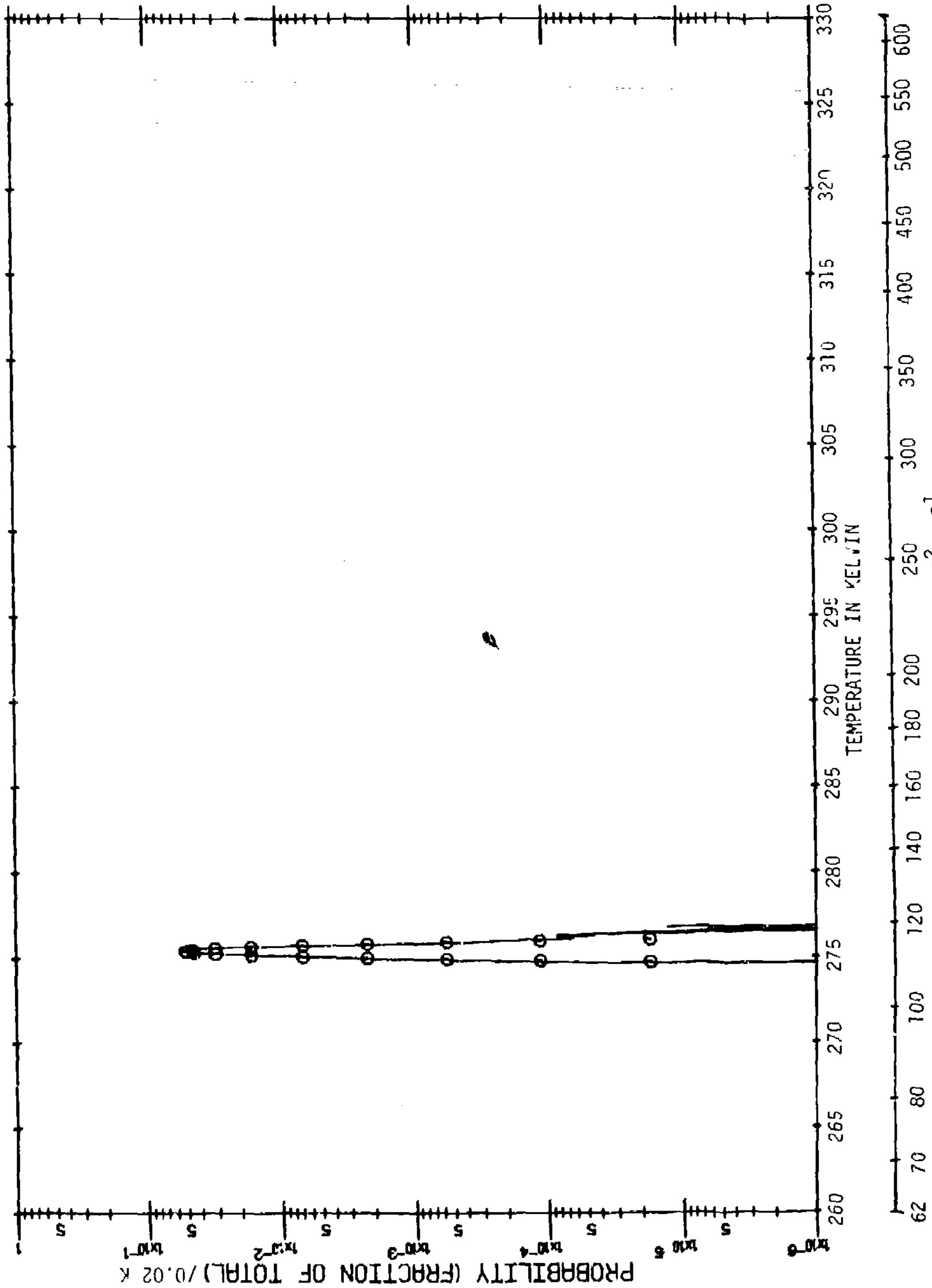
Area: CONIFERS - Moon (Angle: 35 Deg.) Wavelength = 3.5 - 3.9 µm
Mean = 285.05
Std. Dev. = 2.84



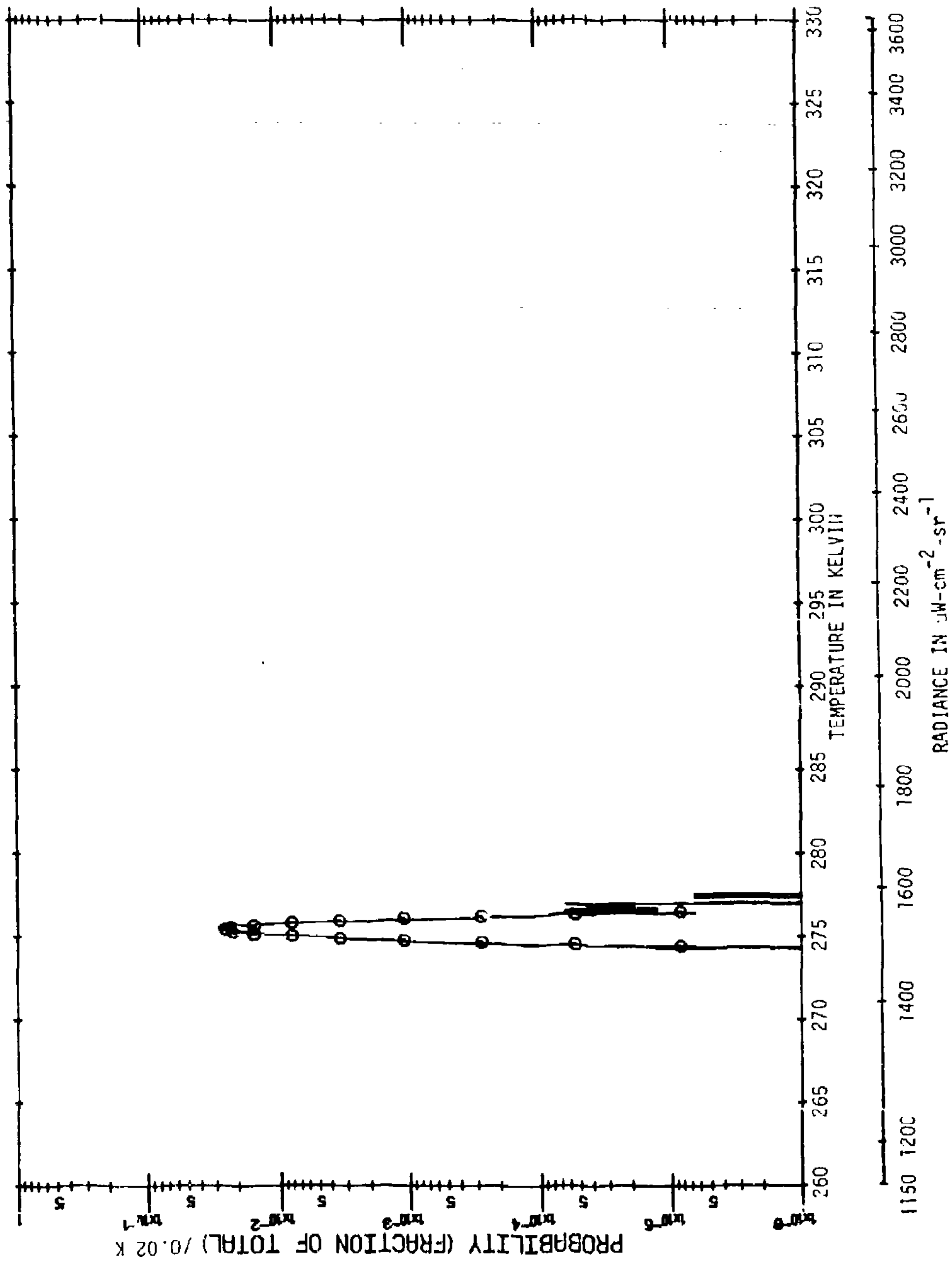
Area: CONIFERS - Noon (Angle: 35 Deg.) Wavelength = 4.5 - 5.5 um
Mean = 278.69
Std. Dev. = 0.54



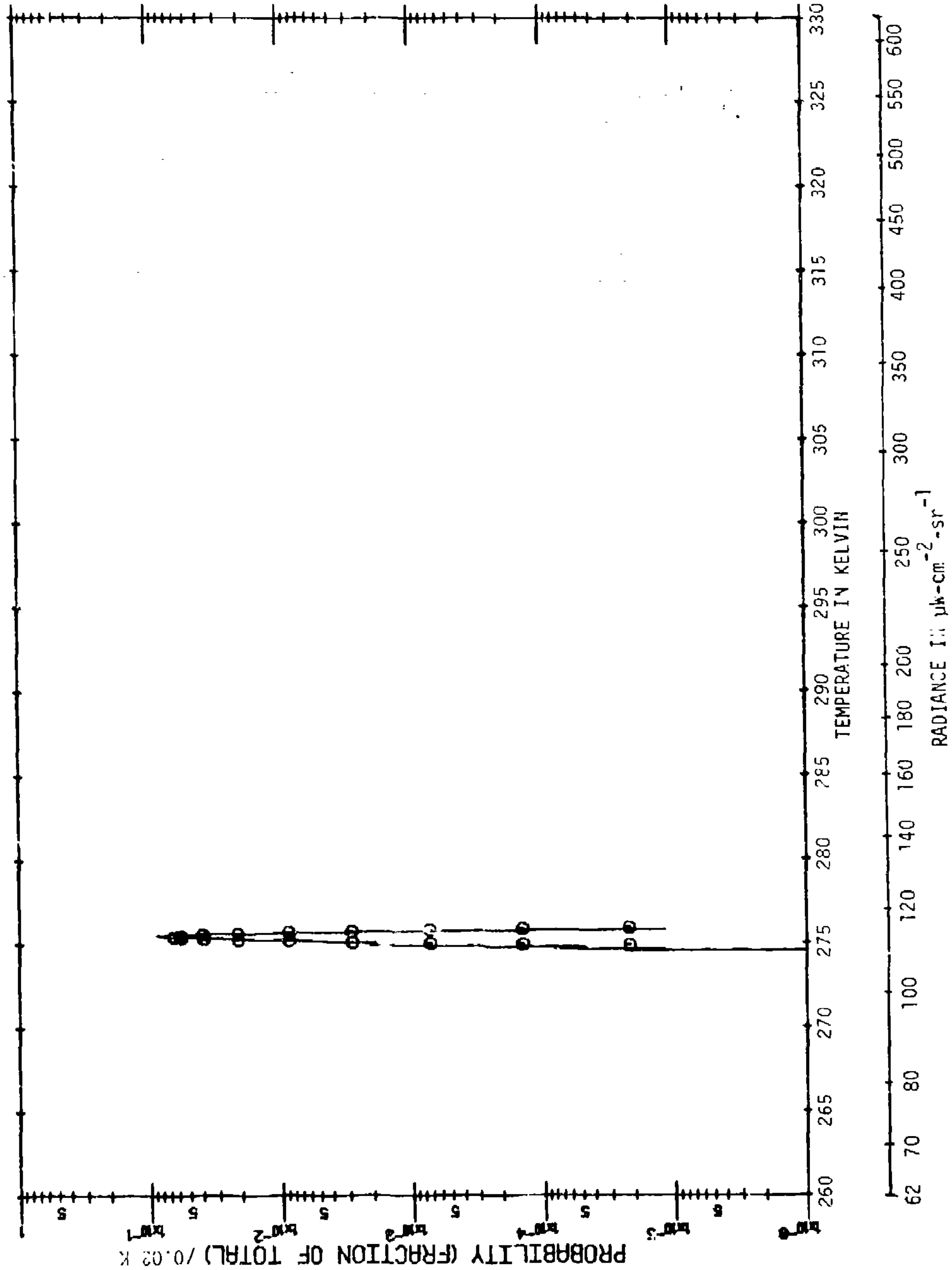
Area: CONIFERS - Noon (Angle: 35 Deg.) Wavelength = 9.0 - 11.4 μm
Mean = 280.03
Std. Dev. = 0.84



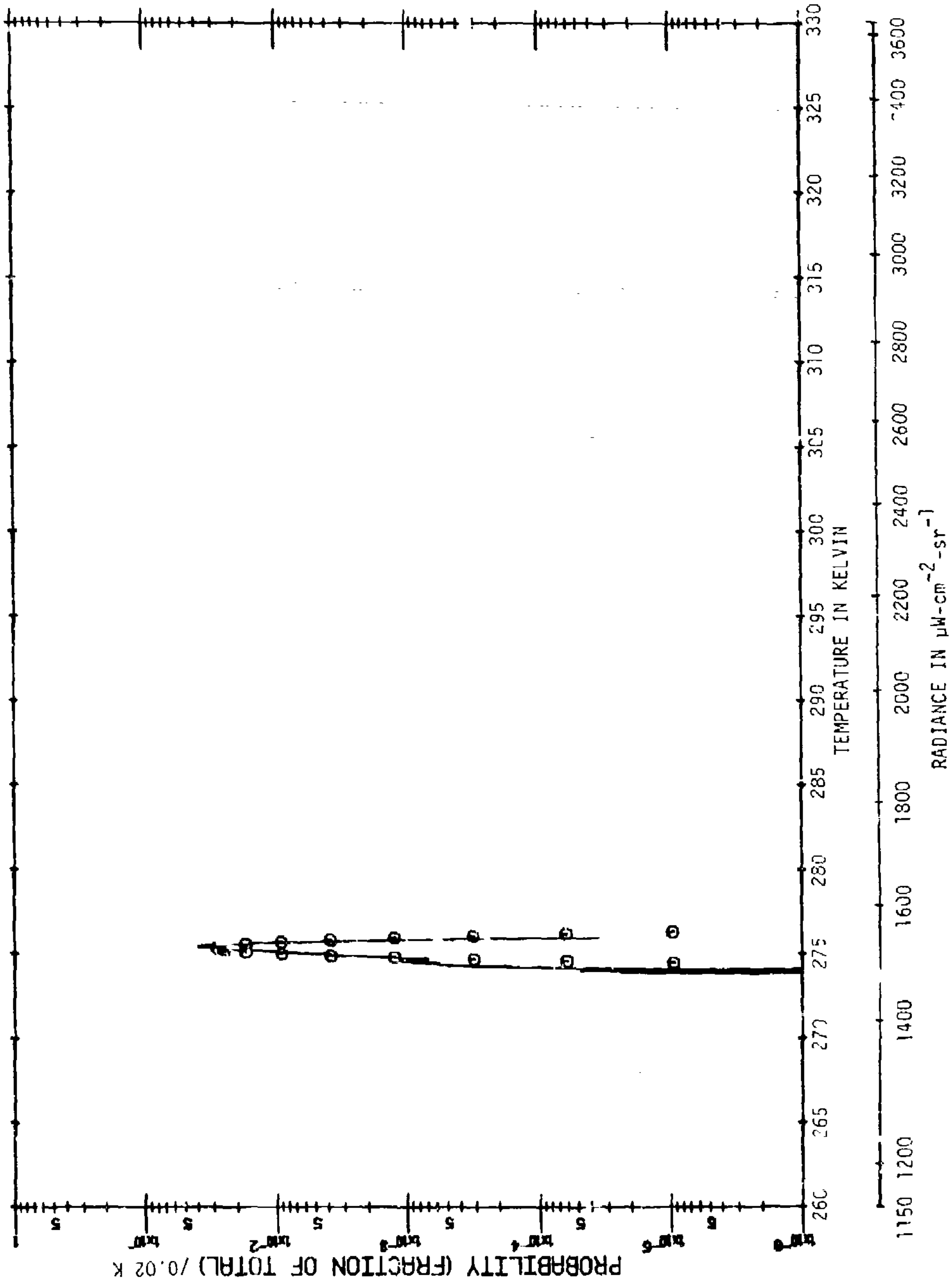
Area: CONIFERS - Sunset (Angle: 90 Deg.) Wavelength = 4.5 - 5.5 μm
Mean = 275.40
Std. Dev. = 0.17



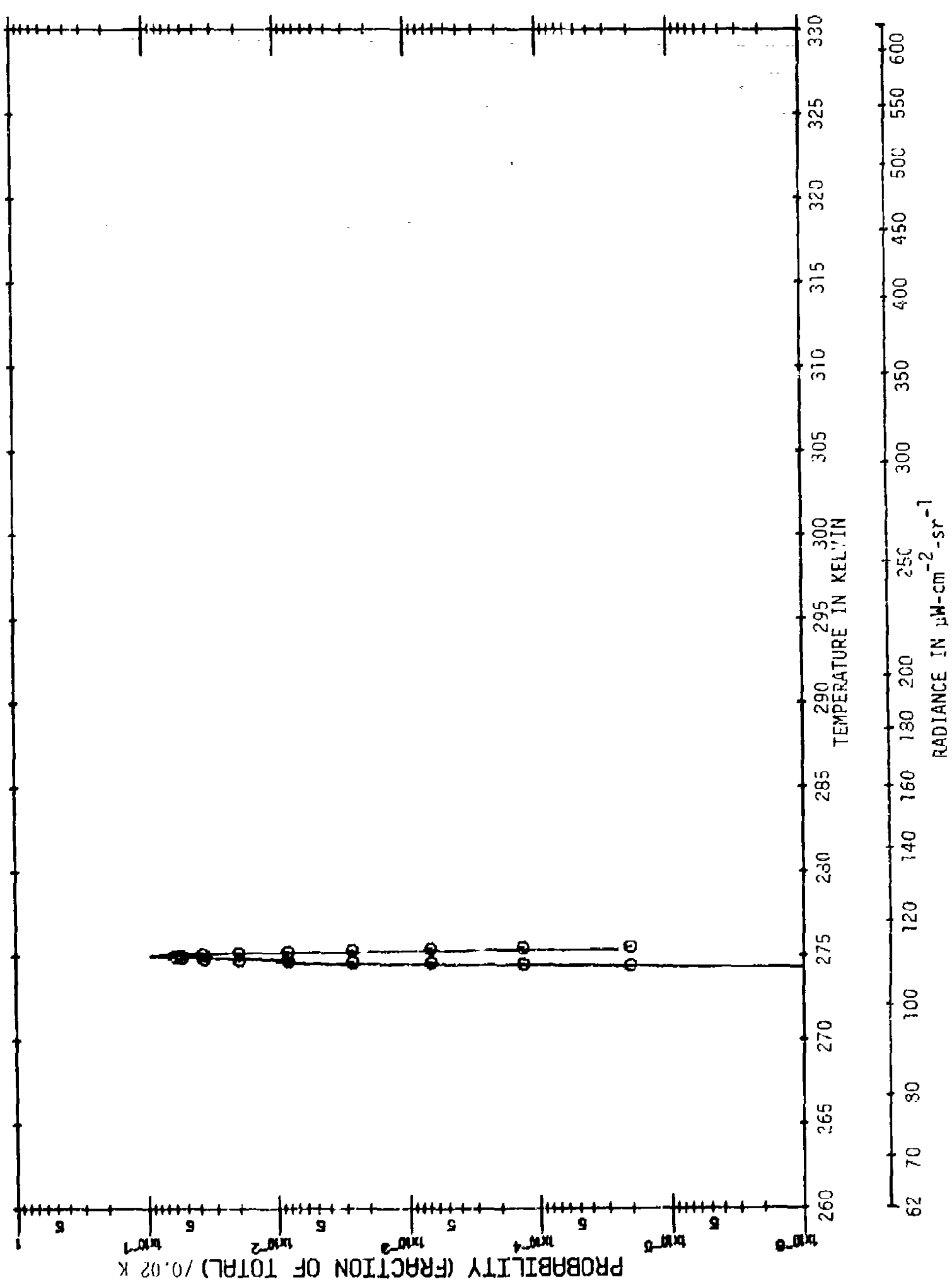
Area: CONIFERS - Sunset (Angle: 90 Deg.) Wavelength = 9.0 - 11.4 μm
Mean = 275.44
Std. Dev. = 0.26



Area: CONIFERS - Sunset (Angle: 35 Deg.) Wavelength = 4.5 - 5.5 um
Mean = 275.43
Std. Dev. = 0.13

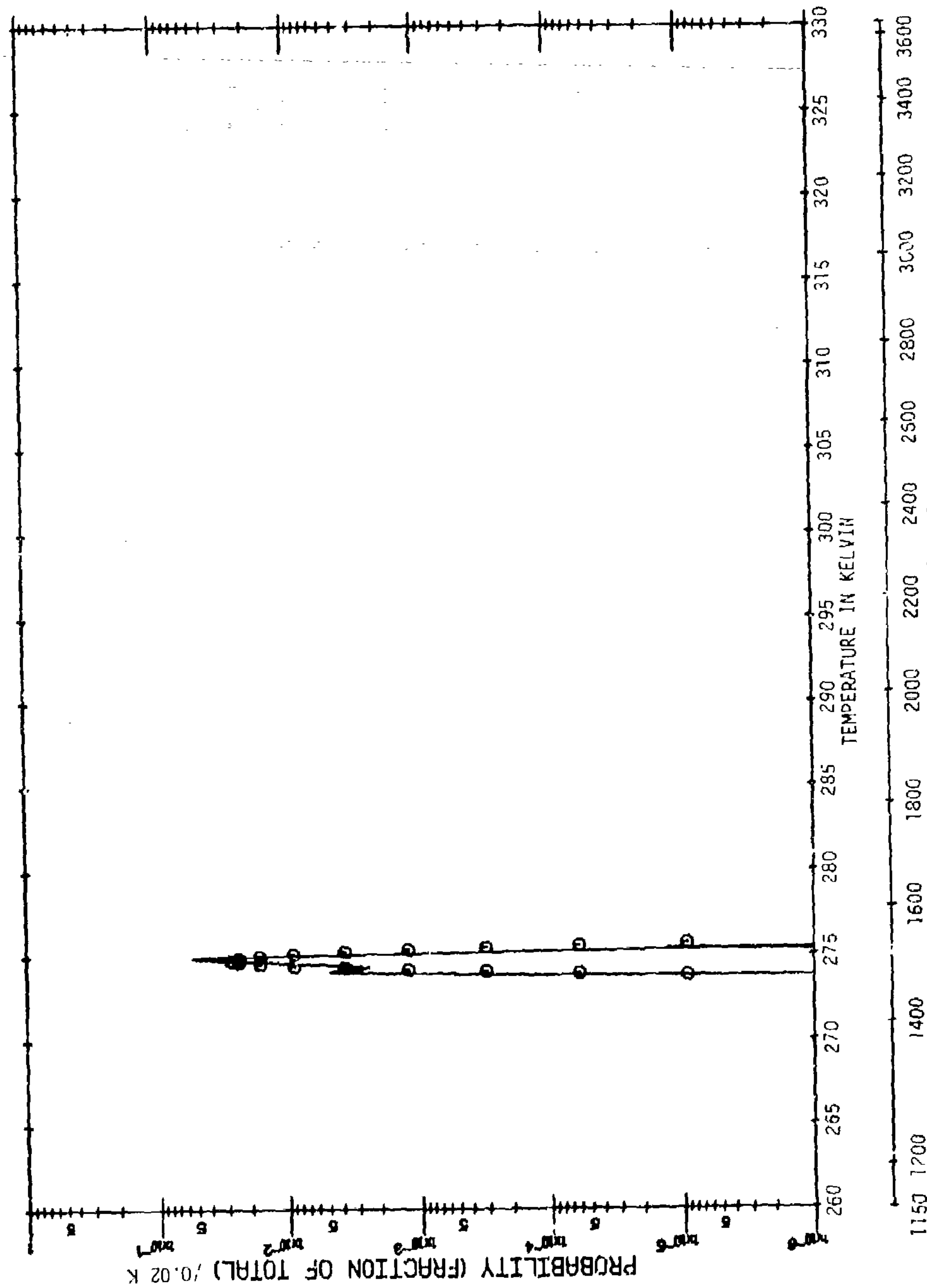


Area: CONIFERS - Sunset (Angle: 35 Deg.) Wavelength = 9.0 - 11.4 um
Mean = 275.37
Std. Dev = 0.23

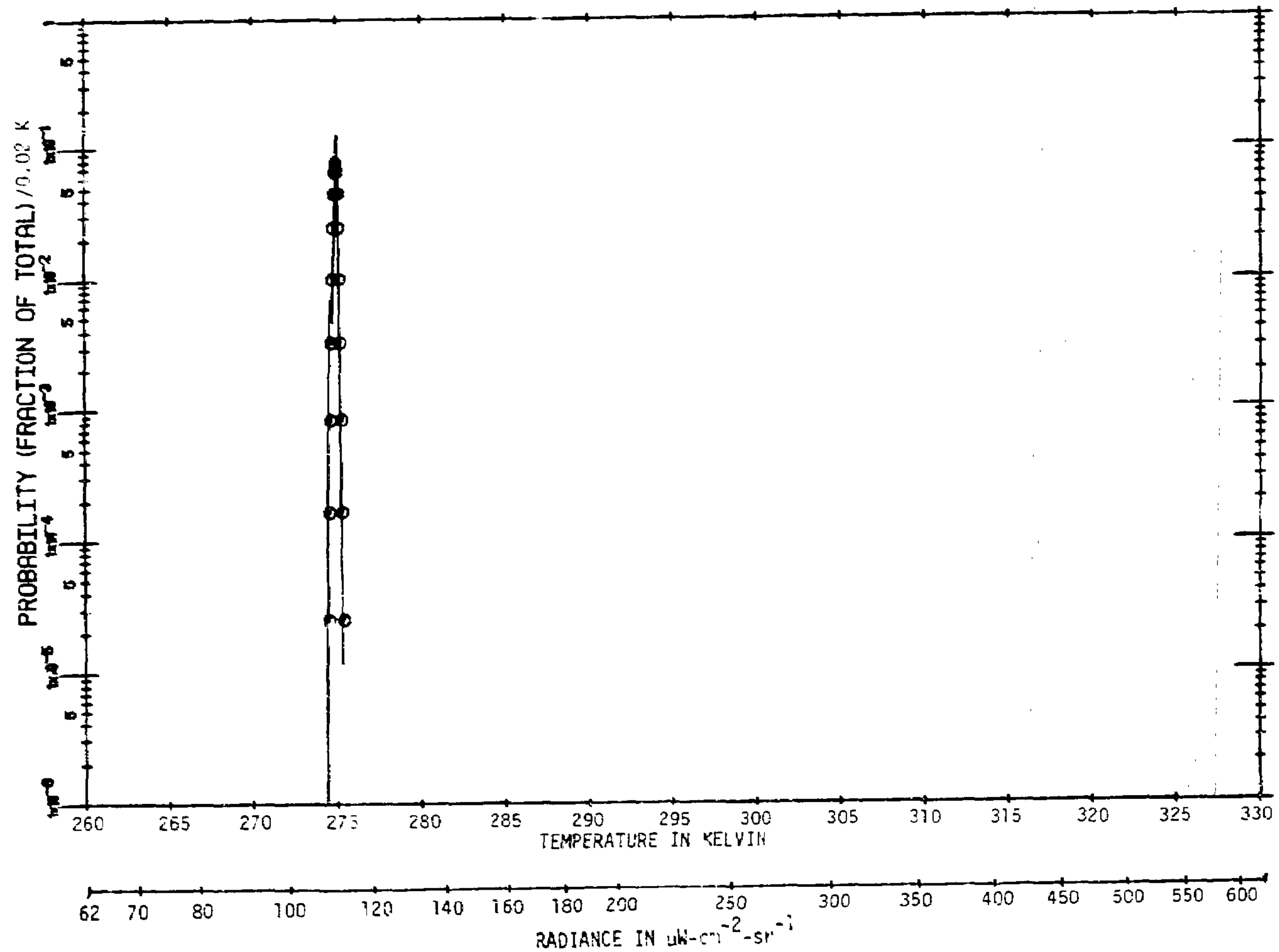


Area: CONIFERS - Midnight (Angle: 90 Deg.) Wavelength = 4.5 - 5.5 μm
Mean = 274.98
Std. Dev. = 0.14

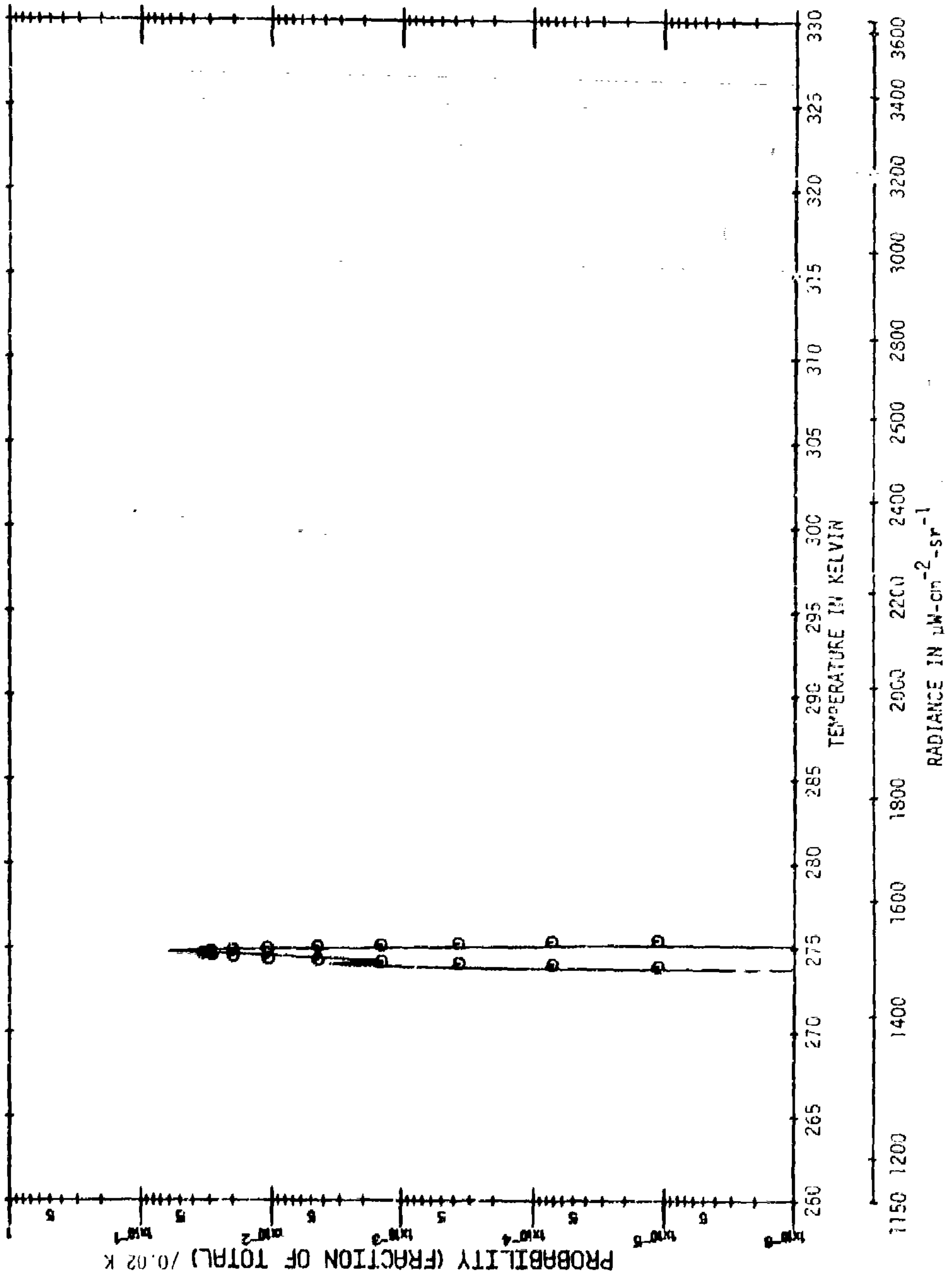
ERIM



Area: CONIFERS - Midnight (Angle: 90 Deg.) Wavelength = 9.0 - 11.4 μm
Mean = 274.76
Std. Dev. = 0.24



Area: CONIFERS - Midnight (Angle: 35 Deg.) Wavelength = 4.5 - 5.5 um
Mean = 275.00
Std. Dev. = 0.11



Area: CONIFERS - Midnight (Angle: 35 Deg.) Wavelength = 9.0 - 11.4 um
Mean = 274.72
Std. Dev. = 0.20

MICHIGAN WINTER SCENE - CONIFERS

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands

Spectral Bands:	Channel 8:	3.5 - 3.9 μm (°K)
	Channel 10:	4.5 - 5.5 μm (°K)
	Channel 12:	9.0 - 11.4 μm (°K)

STATISTICS OF THE CONIFERS (PRE-DAWN) SCENE

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.658	1.000

Channels	10	12
Mean	2.7486E+02	2.7466E+02
Standard Deviation	9.7860E-02	1.7563E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.553	1.000

Channels	10	12
Mean	2.7483E+02	2.7466E+02
Standard Deviation	7.0218E-02	1.3288E-01
Total Points	84400.	84400.

STATISTICS OF THE CONIFERS (NOON) SCENE

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 8 (3.5 - 3.9 μm)
10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	8	10	12
8	1.000		
10	0.169	1.000	
12	0.188	0.611	1.000

Channels	8	10	12
Mean	2.8177E+02	2.7758E+02	2.7868E+02
Standard Deviation	3.6689E+00	6.3410E-01	9.3872E-01
Total Points	153200.	153200.	153200.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	8	10	12
8	1.000		
10	0.206	1.000	
12	0.228	0.640	1.000

Channels	8	10	12
Mean	2.8505E+02	2.7869E+02	2.8003E+02
Standard Deviation	2.8419E+00	5.3734E-01	8.3943E-01
Total Points	83600.	83600.	83600.

STATISTICS OF THE CONFIERS (SUNSET) SCENE

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

<u>90° Depression</u>

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.768	1.000

Channels	10	12
Mean	2.7540E+02	2.7544E+02
Standard Deviation	1.6557E-01	2.6030E-01
Total Points	154000.	154000.

<u>35° Depression</u>

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.793	1.000

Channels	10	12
Mean	2.7543E+02	2.7537E+02
Standard Deviation	1.3133E-01	2.2989E-01
Total Points	84400.	84400.

STATISTICS OF THE CONIFERS (MIDNIGHT) SCENE

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

<u>90° Depression</u>

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.837	1.000

Channels	10	12
Mean	2.7498E+02	2.7476E+02
Standard Deviation	1.3947E-01	2.3721E-01
Total Points	154000.	154000.

<u>35° Depression</u>

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

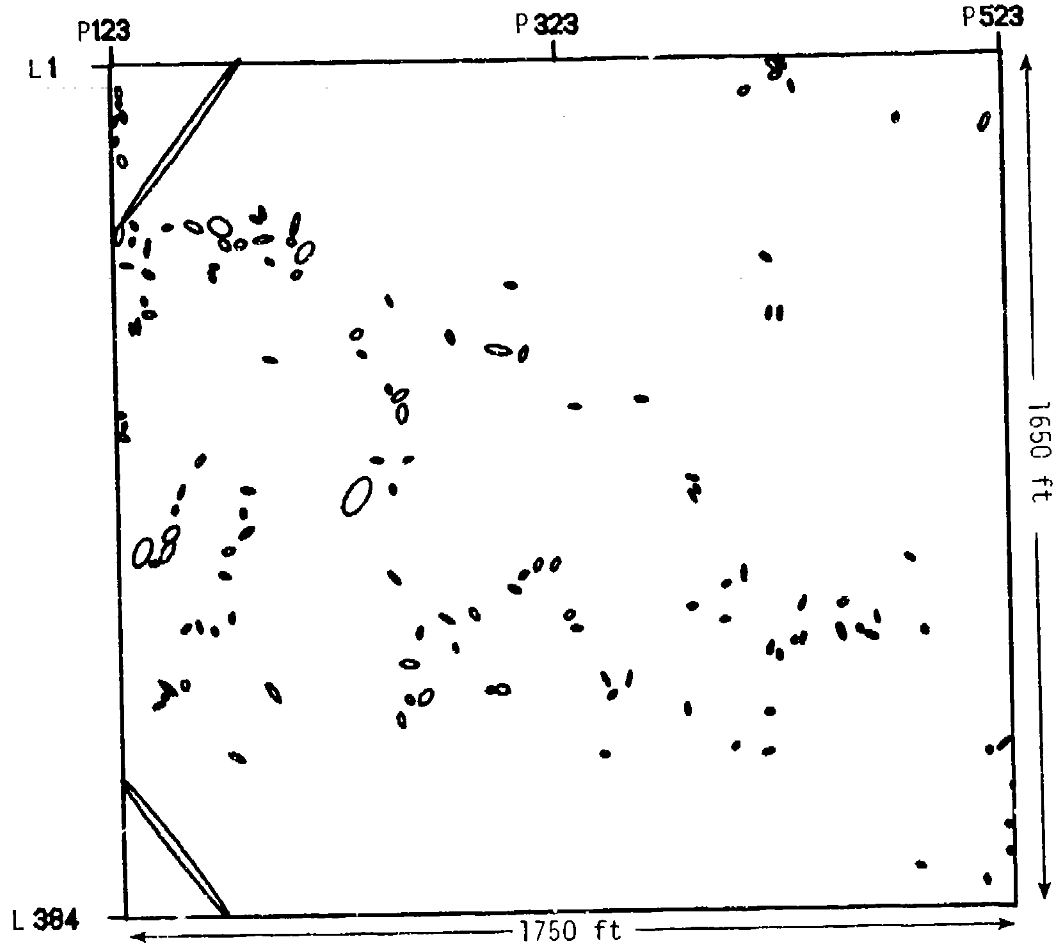
Correlation	10	12
10	1.000	
12	0.814	1.000

Channels	10	12
Mean	2.7500E+02	2.7472E+02
Standard Deviation	1.0951E-01	1.9783F-01
Total Points	84400.	84400.

MICHIGAN WINTER SCENE - CONIFERS

Ellipse Statistics

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: Conifers (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 1.71 σ
Mean = 274.86 Kelvin
Std. Dev. = σ = 0.10 Kelvin
EQUIVALENT ELLIPTICAL AREAS - PRE-DAWN

CONIFERS (Pre-Dawn)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.71 σ

Wavelength = 4.5 - 5.5 μm

Mean = 274.86 Kelvin

σ = 0.10 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	34
10.0	TO	15.0	45
15.0	TO	20.0	21
20.0	TO	25.0	13
25.0	TO	30.0	5
30.0	TO	35.0	2
35.0	TO	40.0	4
40.0	TO	45.0	0
45.0	TO	50.0	4
50.0	TO	75.0	2
75.0	TO	100.0	1
100.0	TO	150.0	2
150.0	TO	200.0	0
200.0	TO	250.0	1
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 136

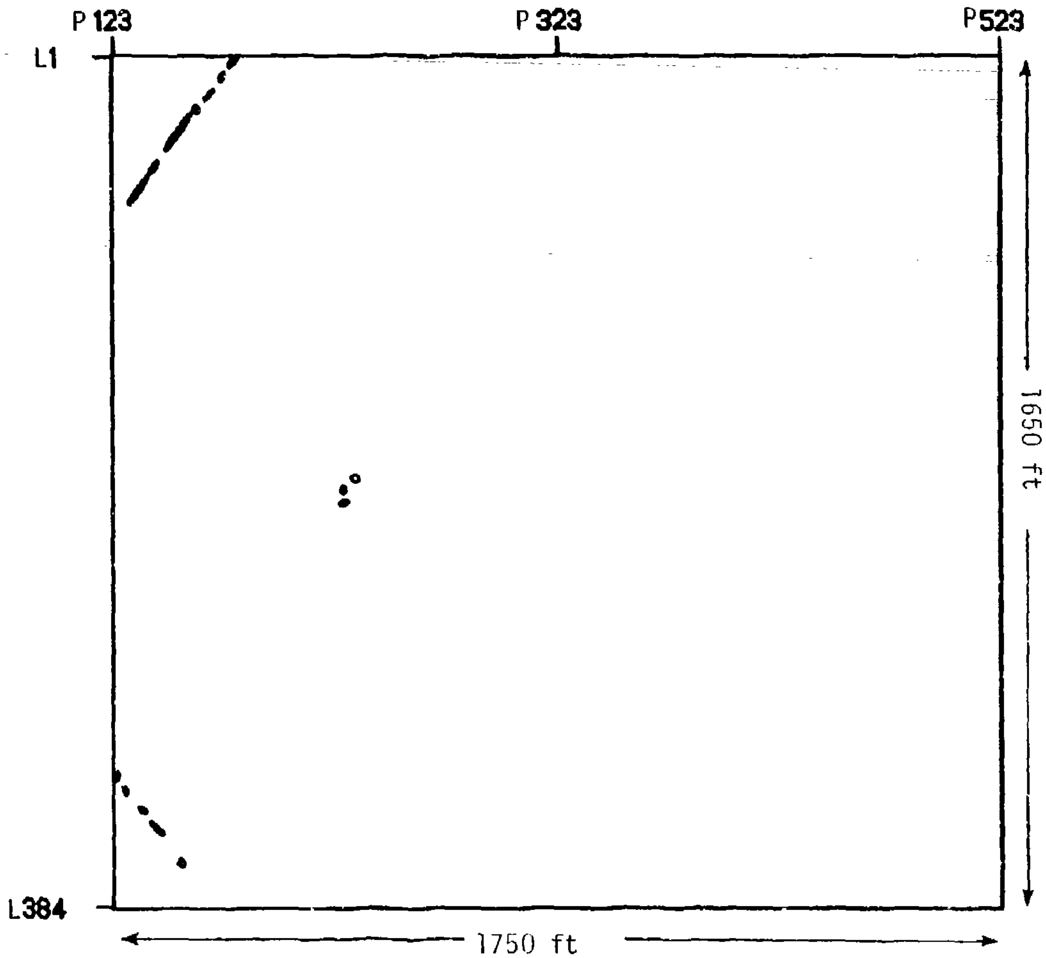
2043 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	9
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	18
17	TO	20	55	TO	65	14
20	TO	22	65	TO	72	17
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	15
26	TO	28	85	TO	91	13
28	TO	30	91	TO	98	7
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	18
39	TO	45	127	TO	147	10
45	TO	55	147	TO	180	4
55	TO	71	180	TO	232	4
71	TO	100	232	TO	328	1
	OVER	100		OVER	328	6

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	3
1.2	TO	1.3	9
1.3	TO	1.4	5
1.4	TO	1.5	5
1.5	TO	1.6	14
1.6	TO	1.7	11
1.7	TO	1.8	11
1.8	TO	1.9	9
1.9	TO	2.0	10
2.0	TO	2.4	35
2.4	TO	2.6	11
2.6	TO	2.8	4
2.8	TO	3.0	2
3.0	TO	3.5	2
3.5	TO	4.0	2
4.0	TO	4.5	2
	OVER	4.5	1



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.25 σ

Mean = 274.86 Kelvin

Std. Dev. = σ = 0.10 Kelvin

EQUIVALENT ELLIPTICAL AREAS - PRE-DAWN

CONIFERS (Pre-Dawn)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.25 σ
Wavelength = 4.5 - 5.5 μm
Mean = 274.86 Kelvin
σ = 0.10 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	3
10.0	TO	15.0	7
15.0	TO	20.0	3
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 15

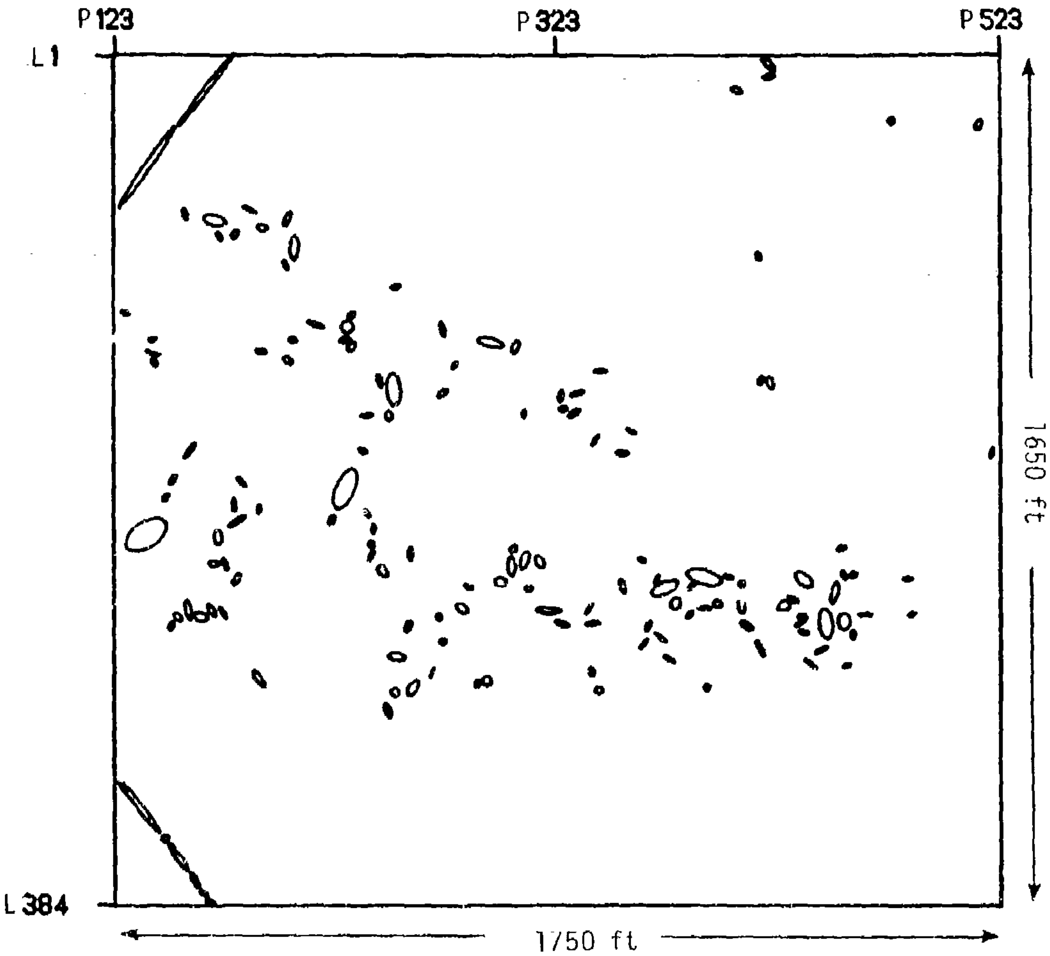
51 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	2
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	3
20	TO	22	65	TO	72	3
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	1
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	2
1.3	TO	1.4	0
1.4	TO	1.5	2
1.5	TO	1.6	2
1.6	TO	1.7	0
1.7	TO	1.8	2
1.8	TO	1.9	1
1.9	TO	2.0	1
2.0	TO	2.4	2
2.4	TO	2.6	1
2.6	TO	2.8	2
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm

Temperature Threshold = Mean + 1.56 σ

Mean = 274.66 Kelvin

Std. Dev. = σ = 0.18 Kelvin

EQUIVALENT ELLIPTICAL AREAS - PRE-DAWN

CONIFERS (Pre-Dawn)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.56 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.66 Kelvin

σ = 0.18 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	33
10.0 TO	15.0	48
15.0 TO	20.0	24
20.0 TO	25.0	12
25.0 TO	30.0	4
30.0 TO	35.0	6
35.0 TO	40.0	4
40.0 TO	45.0	4
45.0 TO	50.0	0
50.0 TO	75.0	5
75.0 TO	100.0	1
100.0 TO	150.0	4
150.0 TO	200.0	2
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 149

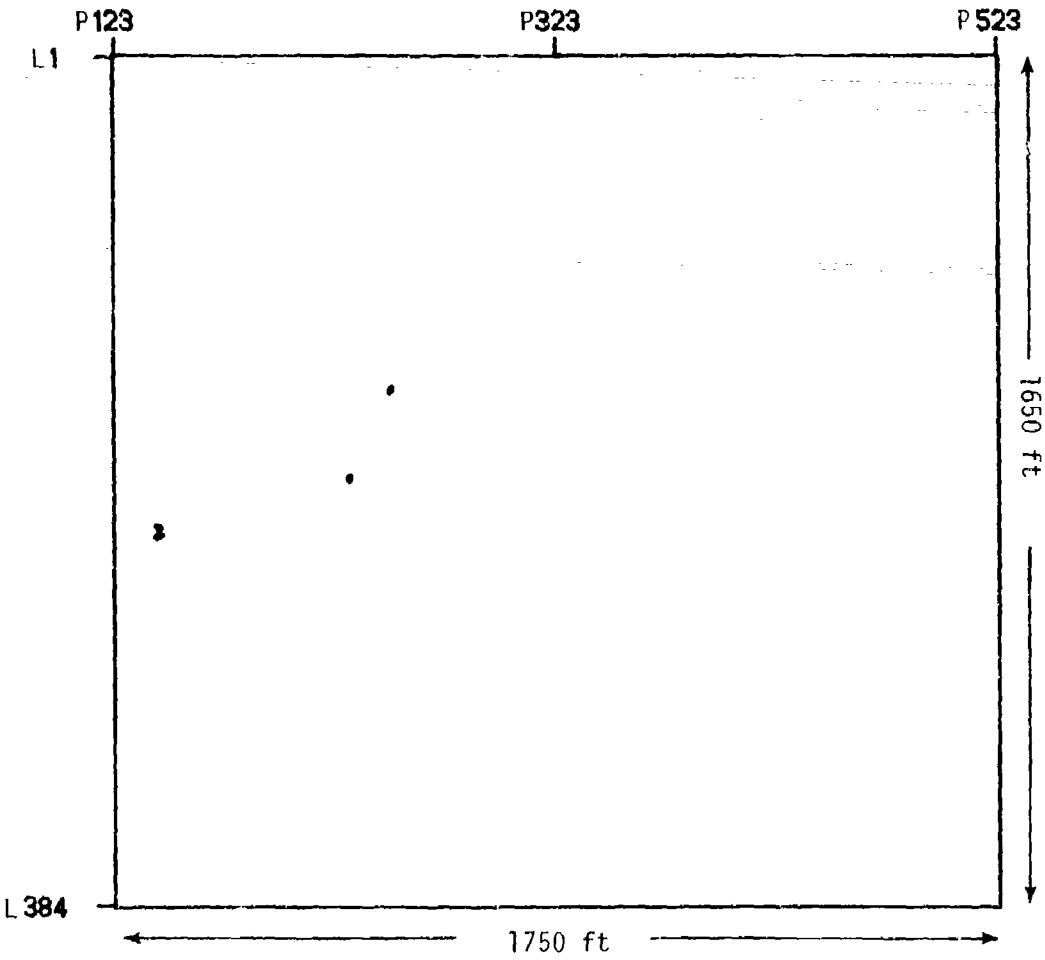
902 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	13
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	25
17 TO	20	55 TO	65	26
20 TO	22	65 TO	72	16
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	13
26 TO	28	85 TO	91	8
28 TO	30	91 TO	98	2
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	16
39 TO	45	127 TO	147	7
45 TO	55	147 TO	180	7
55 TO	71	180 TO	232	4
71 TO	100	232 TO	328	3
OVER	100	OVER	328	9

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	3
1.2 TO 1.3	17
1.3 TO 1.4	12
1.4 TO 1.5	6
1.5 TO 1.6	17
1.6 TO 1.7	18
1.7 TO 1.8	19
1.8 TO 1.9	9
1.9 TO 2.0	5
2.0 TO 2.4	22
2.4 TO 2.6	7
2.6 TO 2.8	2
2.8 TO 3.0	2
3.0 TO 3.5	5
3.5 TO 4.0	3
4.0 TO 4.5	2
OVER 4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.12 σ

Mean = 274.66 Kelvin

Std. Dev. = σ = 0.18 Kelvin

EQUIVALENT ELLIPTICAL AREAS - PRE-DAWN

CONIFERS (Pre-Dawn)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.12 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.66 Kelvin

σ = 0.18 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	3
10.0 TO	15.0	1
15.0 TO	20.0	0
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 4

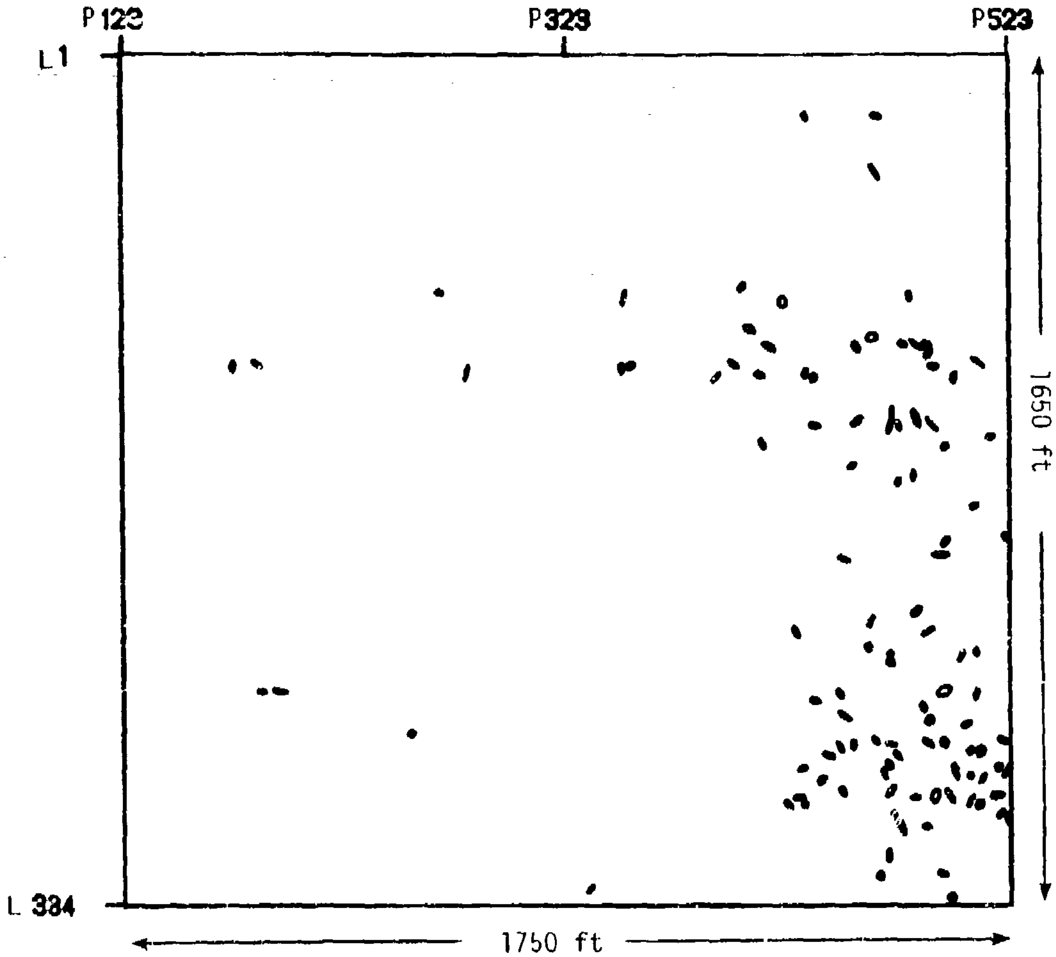
25 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	2
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	2
1.3 TO 1.4	0
1.4 TO 1.5	0
1.5 TO 1.6	1
1.6 TO 1.7	0
1.7 TO 1.8	1
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 3.5 - 3.9 μm)

Temperature Threshold = Mean + 1.65 σ

Mean = 281.77 Kelvin

Std. Dev. = σ = 3.67 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.65 σ

Wavelength = 3.5 - 3.9 μm

Mean = 281.77 Kelvin

σ = 3.67 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	42
10.0	TO	15.0	51
15.0	TO	20.0	10
20.0	TO	25.0	4
25.0	TO	30.0	0
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 108

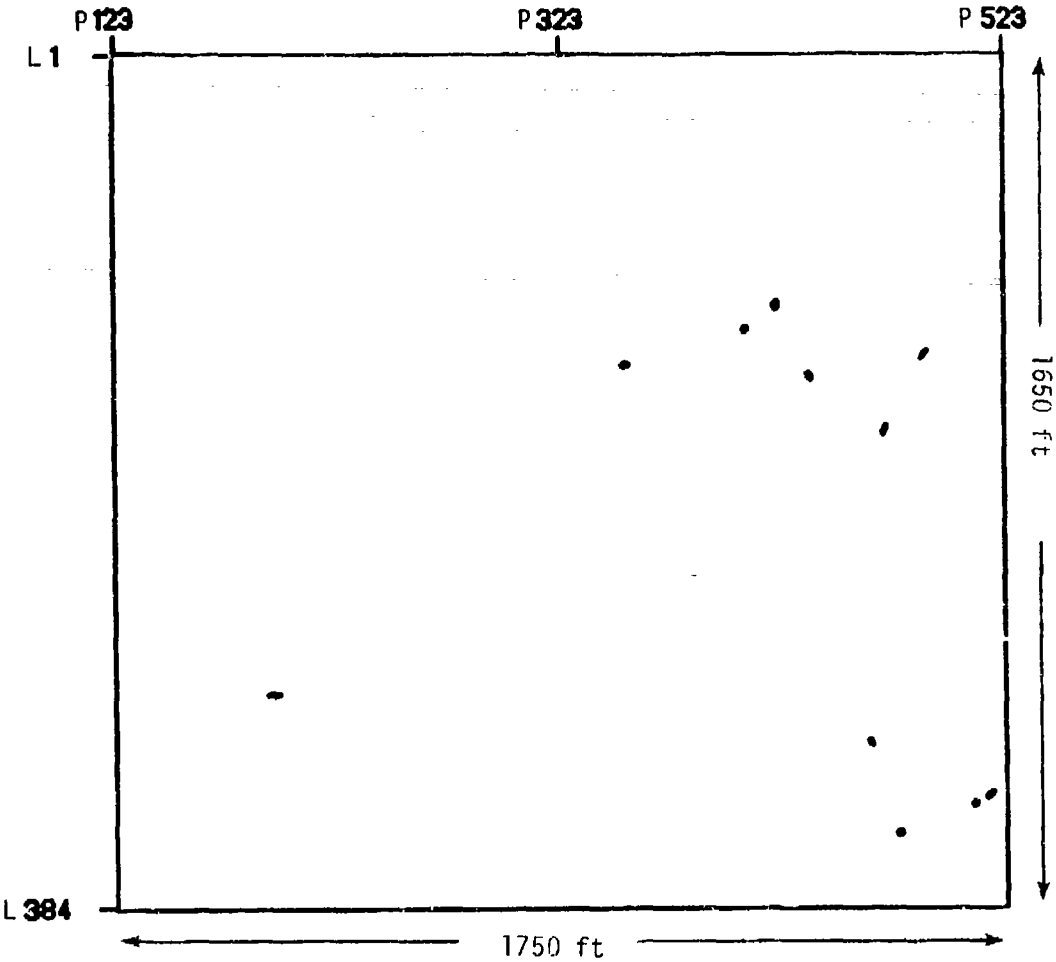
3898 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	4
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	14
17	TO	20	55	TO	65	15
20	TO	22	65	TO	72	20
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	18
26	TO	28	85	TO	91	13
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	8
39	TO	45	127	TO	147	2
45	TO	55	147	TO	180	4
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	1
	OVER	100		OVER	328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	4
1.3	TO	1.4	2
1.4	TO	1.5	0
1.5	TO	1.6	13
1.6	TO	1.7	4
1.7	TO	1.8	14
1.8	TO	1.9	10
1.9	TO	2.0	9
2.0	TO	2.4	40
2.4	TO	2.6	3
2.6	TO	2.8	3
2.8	TO	3.0	2
3.0	TO	3.5	4
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Conifers (Wavelength = 3.5 - 3.9 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 281.77 Kelvin

Std. Dev. = σ = 3.67 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 3.5 - 3.9 μm
Mean = 281.77 Kelvin
σ = 3.67 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	7
10.0 TO	15.0	4
15.0 TO	20.0	0
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 11

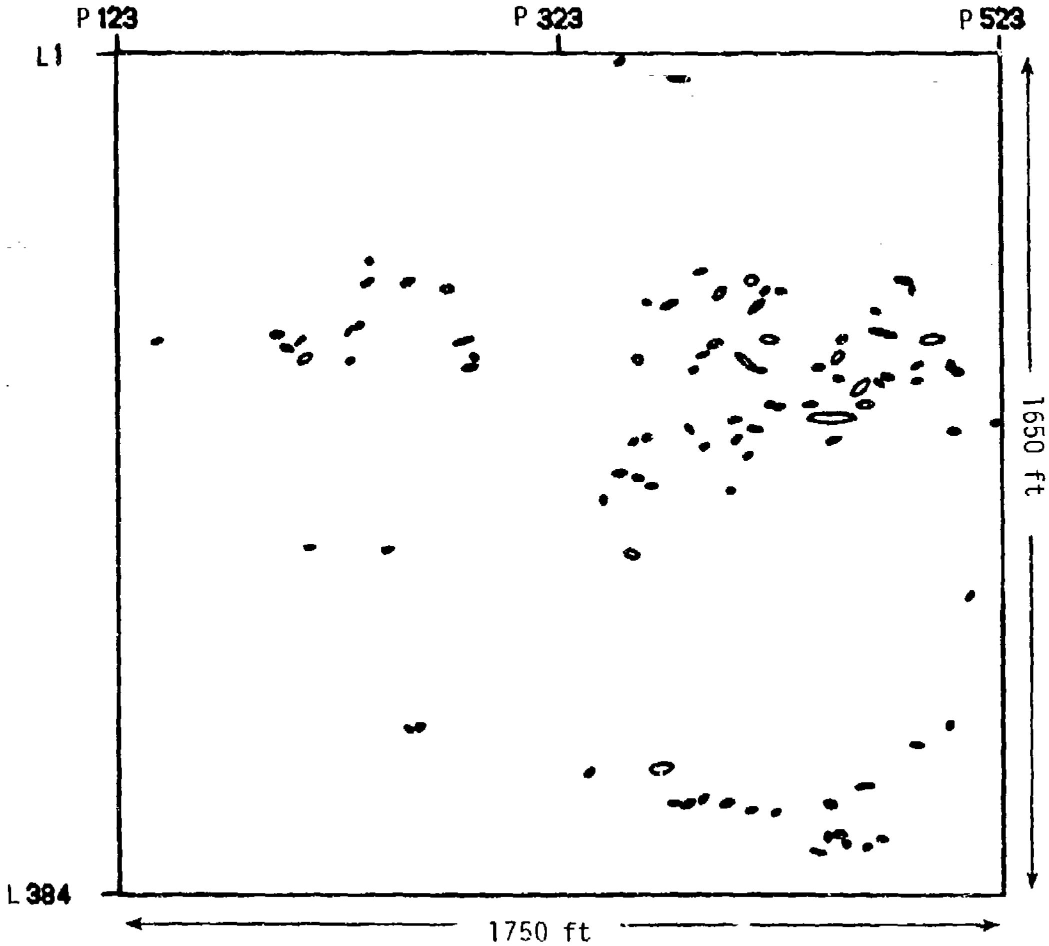
1670 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	4
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	2
26 TO 28	85 TO 91	1
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	0
1.5 TO 1.6	1
1.6 TO 1.7	1
1.7 TO 1.8	3
1.8 TO 1.9	0
1.9 TO 2.0	1
2.0 TO 2.4	5
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.17 σ

Mean = 277.58 Kelvin

Std. Dev. = σ = 0.63 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.17 σ

Wavelength = 4.5 - 5.5 μm

Mean = 277.58 Kelvin

σ = 0.63 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	22
10.0	TO	15.0	34
15.0	TO	20.0	18
20.0	TO	25.0	4
25.0	TO	30.0	5
30.0	TO	35.0	4
35.0	TO	40.0	1
40.0	TO	45.0	1
45.0	TO	50.0	1
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	1
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 93

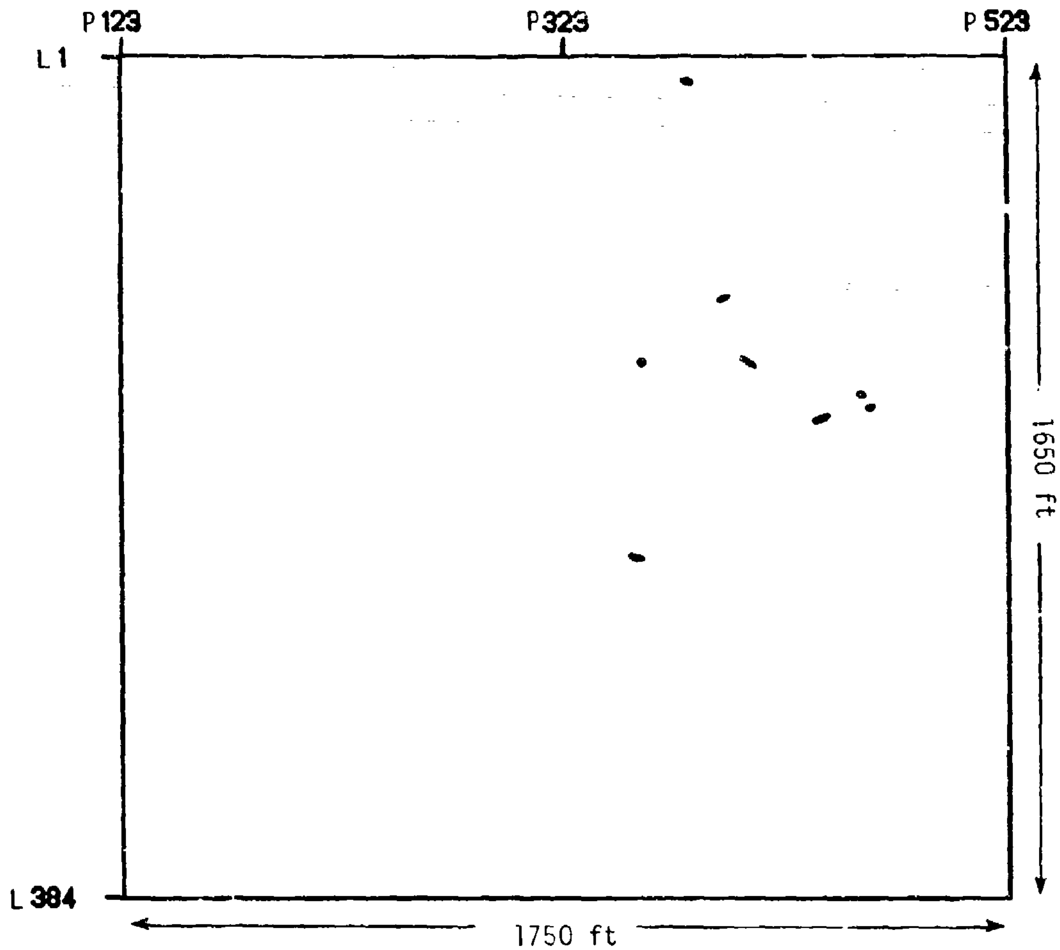
406 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	8
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	25
17	TO	20	55	TO	65	16
20	TO	22	65	TO	72	9
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	9
26	TO	28	85	TO	91	3
28	TO	30	91	TO	98	7
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	8
39	TO	45	127	TO	147	3
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	2
71	TO	100	232	TO	328	0
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	1
1.2	TO	1.3	11
1.3	TO	1.4	15
1.4	TO	1.5	7
1.5	TO	1.6	15
1.6	TO	1.7	14
1.7	TO	1.8	11
1.8	TO	1.9	3
1.9	TO	2.0	5
2.0	TO	2.4	8
2.4	TO	2.6	2
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.79 σ

Mean = 277.58 Kelvin

Std. Dev. = σ = 0.63 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

ERIM

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.79 σ

Wavelength = 4.5 - 5.5 μm

Mean = 277.58 Kelvin

σ = 0.63 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	3
10.0 TO	15.0	3
15.0 TO	20.0	1
20.0 TO	25.0	1
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 8

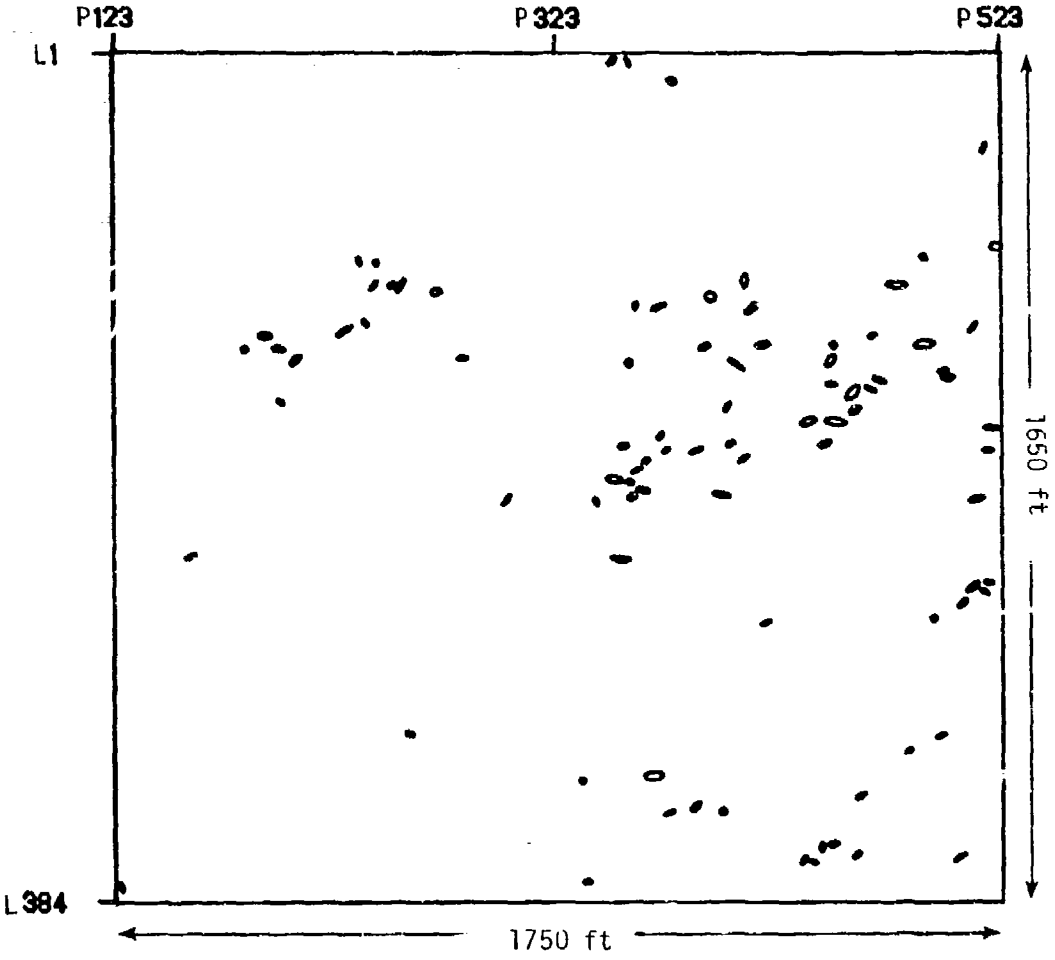
67 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	4
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	1
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	2
1.3 TO 1.4	1
1.4 TO 1.5	0
1.5 TO 1.6	3
1.6 TO 1.7	0
1.7 TO 1.8	1
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.07 σ

Mean = 278.68 Kelvin

Std. Dev. = σ = 0.94 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

ERIM

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.07 σ

Wavelength = 9.0 - 11.4 µm

Mean = 278.68 Kelvin

σ = 0.94 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	30
10.0 TO 15.0	28
15.0 TO 20.0	13
20.0 TO 25.0	6
25.0 TO 30.0	6
30.0 TO 35.0	1
35.0 TO 40.0	1
40.0 TO 45.0	4
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 89

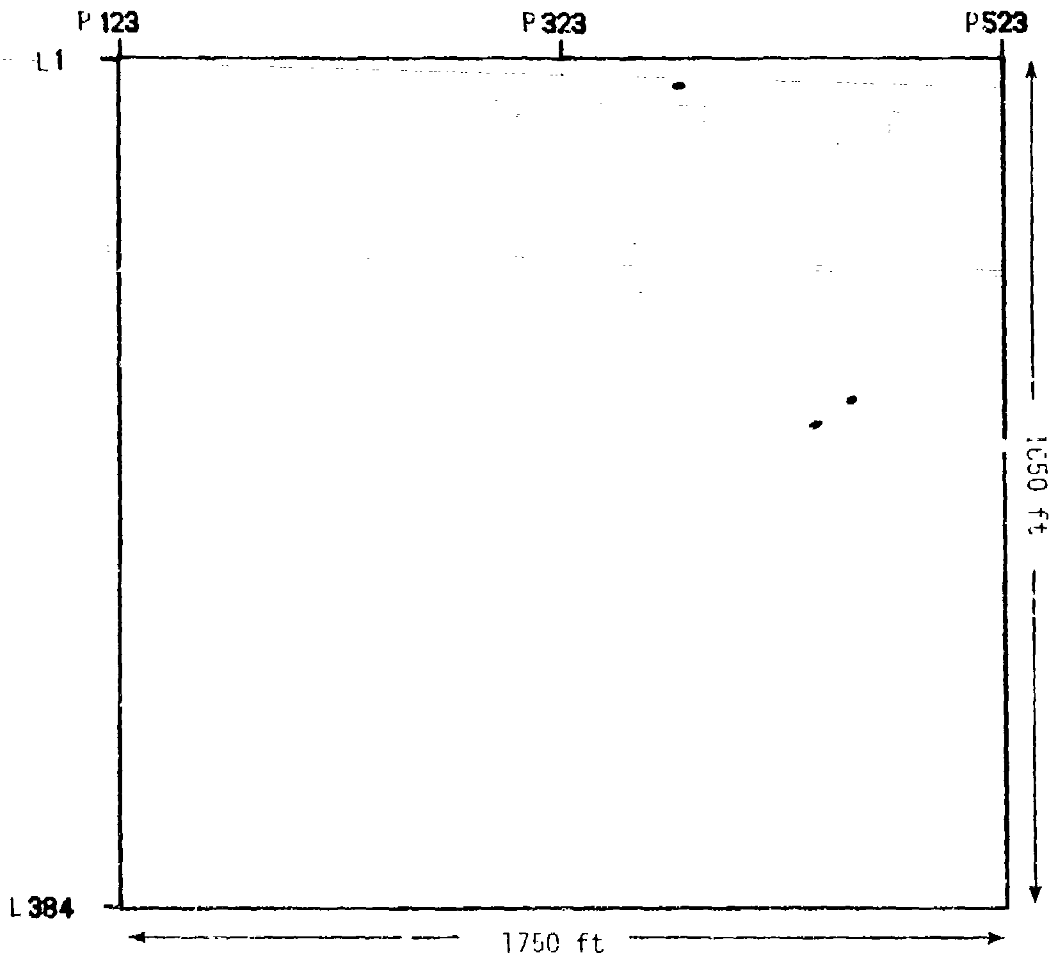
500 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	10
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	20
17 TO 20	55 TO 65	16
20 TO 22	65 TO 72	10
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	7
26 TO 28	85 TO 91	3
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	13
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	4
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	12
1.3 TO 1.4	9
1.4 TO 1.5	2
1.5 TO 1.6	15
1.6 TO 1.7	8
1.7 TO 1.8	18
1.8 TO 1.9	7
1.9 TO 2.0	4
2.0 TO 2.4	13
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.71 σ

Mean = 278.68 Kelvin

Std. Dev. = σ = 0.94 Kelvin

EQUIVALENT ELLIPTICAL AREAS - NOON

CONIFERS (Noon)

DISTRIBUTION OF ELLIPTICAL AREAS GREATEP THAN THRESHOLD

Threshold = Mean + 2.71 σ

Wavelength = 9.0 - 11.4 μm

Mean = 278.68 Kelvin

σ = 0.94 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	2
10.0	TO	15.0	1
15.0	TO	20.0	0
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 3

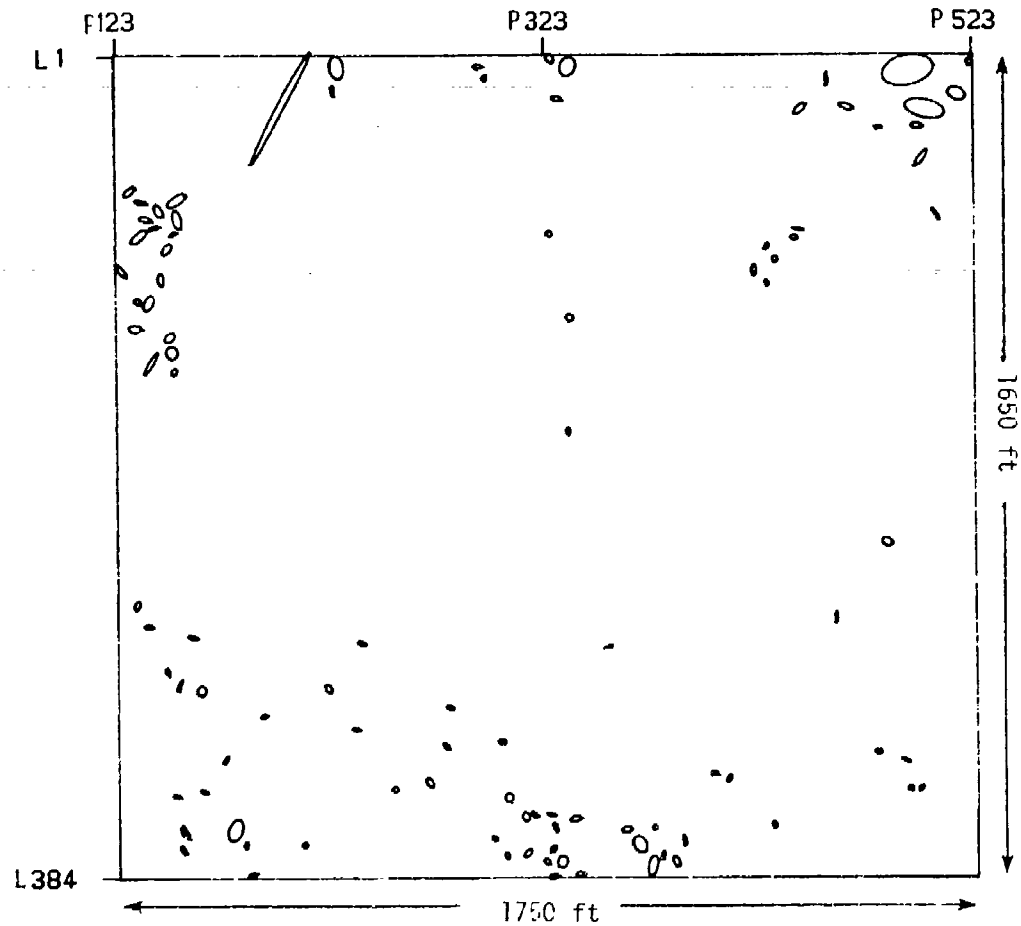
59 FEATURES WITH AREAS LESS THAN 8.00 SQ. METFRS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	1
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	2
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	1
1.3	TO	1.4	1
1.4	TO	1.5	0
1.5	TO	1.6	1
1.6	TO	1.7	0
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	0
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
OVER		4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 275.40 Kelvin

Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS - SUNSET

CONIFERS (Sunset)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.40 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	19
10.0 TO	15.0	39
15.0 TO	20.0	10
20.0 TO	25.0	11
25.0 TO	30.0	2
30.0 TO	35.0	5
35.0 TO	40.0	3
40.0 TO	45.0	2
45.0 TO	50.0	2
50.0 TO	75.0	4
75.0 TO	100.0	2
100.0 TO	150.0	1
150.0 TO	200.0	0
200.0 TO	250.0	1
250.0 TO	300.0	1
300.0 TO	400.0	0
400.0 TO	500.0	1
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 103

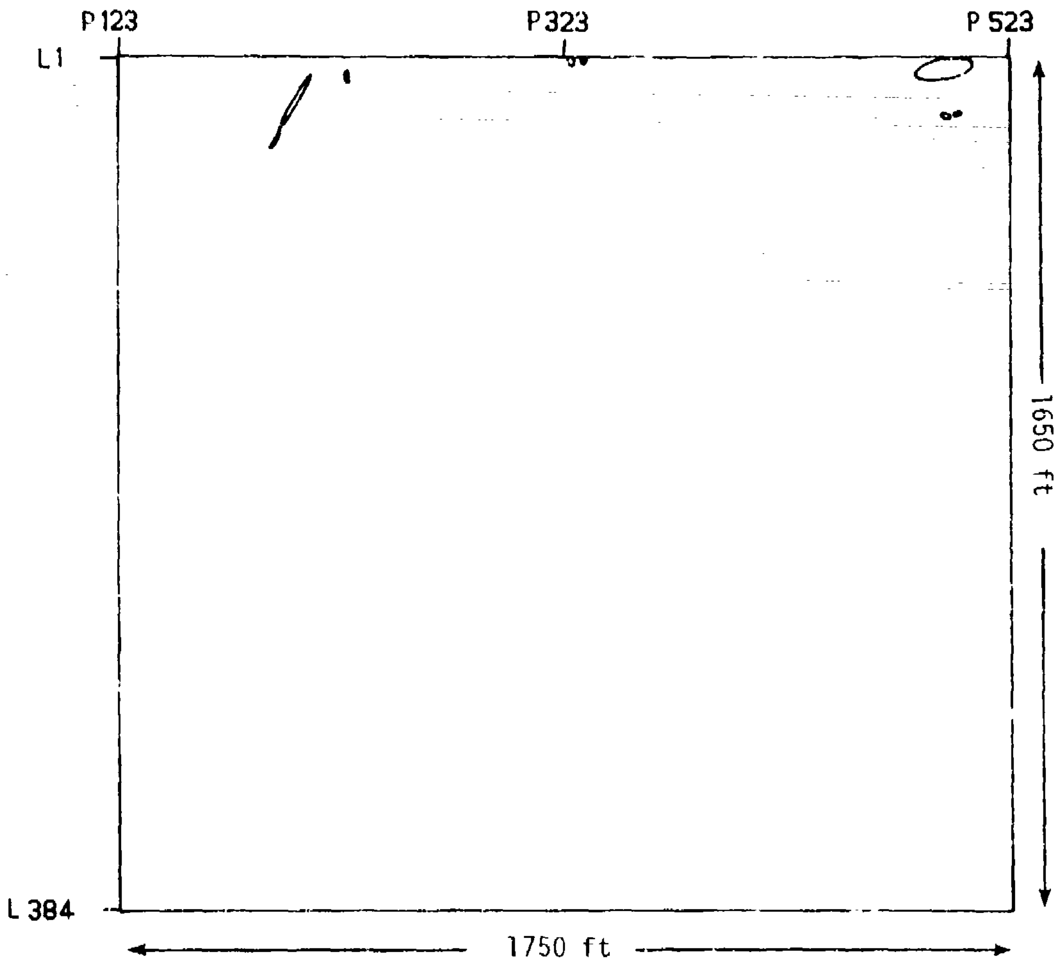
505 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	1
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	6
14 TO 16	45 TO 52	1
16 TO 17	52 TO 55	18
17 TO 20	55 TO 65	19
20 TO 22	65 TO 72	14
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	6
26 TO 28	85 TO 91	4
28 TO 30	91 TO 98	6
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	7
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	7
55 TO 71	180 TO 232	4
71 TO 100	232 TO 328	5
OVER 100	OVER 328	4

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	1
1.1 TO 1.2	3
1.2 TO 1.3	5
1.3 TO 1.4	11
1.4 TO 1.5	7
1.5 TO 1.6	15
1.6 TO 1.7	8
1.7 TO 1.8	13
1.8 TO 1.9	8
1.9 TO 2.0	4
2.0 TO 2.4	10
2.4 TO 2.6	7
2.6 TO 2.8	3
2.8 TO 3.0	2
3.0 TO 3.5	3
3.5 TO 4.0	2
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.24 σ

Mean = 275.40 Kelvin

Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS - SUNSET

CONIFERS (Sunset)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.24 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.40 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	1
10.0	TO	15.0	2
15.0	TO	20.0	3
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 8

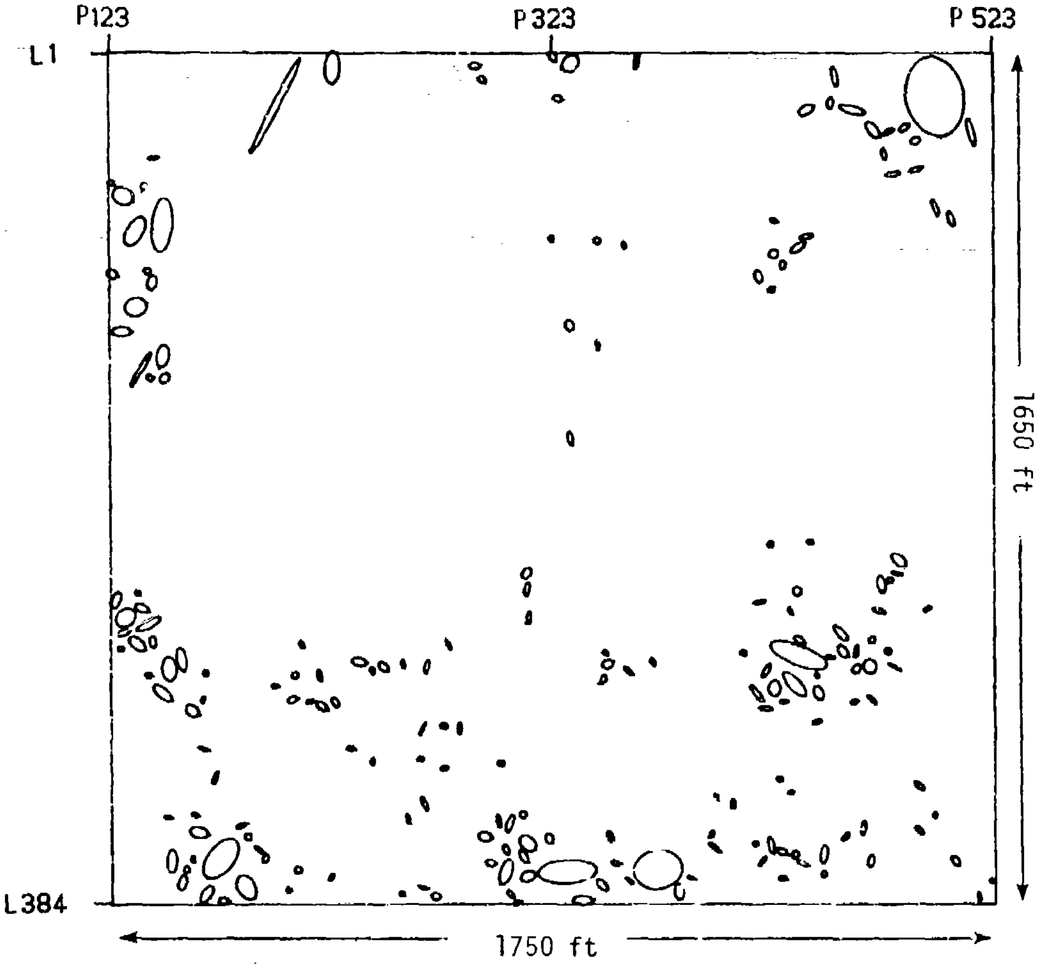
21 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	1
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
	OVER	100		OVER	328	2

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	1
1.3	TO	1.4	0
1.4	TO	1.5	0
1.5	TO	1.6	1
1.6	TO	1.7	2
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	2
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.50 σ

Mean = 275.44 Kelvin

Std. Dev. = σ = 0.26 Kelvin

EQUIVALENT ELLIPTICAL AREAS - SUNSET

CONIFERS (Sunset)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ
Wavelength = 9.0 - 11.4 μm
Mean = 275.44 Kelvin
σ = 0.26 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	32
10.0	TO	15.0	56
15.0	TO	20.0	29
20.0	TO	25.0	20
25.0	TO	30.0	8
30.0	TO	35.0	6
35.0	TO	40.0	7
40.0	TO	45.0	8
45.0	TO	50.0	6
50.0	TO	75.0	12
75.0	TO	100.0	5
100.0	TO	150.0	6
150.0	TO	200.0	0
200.0	TO	250.0	1
250.0	TO	300.0	0
300.0	TO	400.0	3
400.0	TO	500.0	1
	OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 202

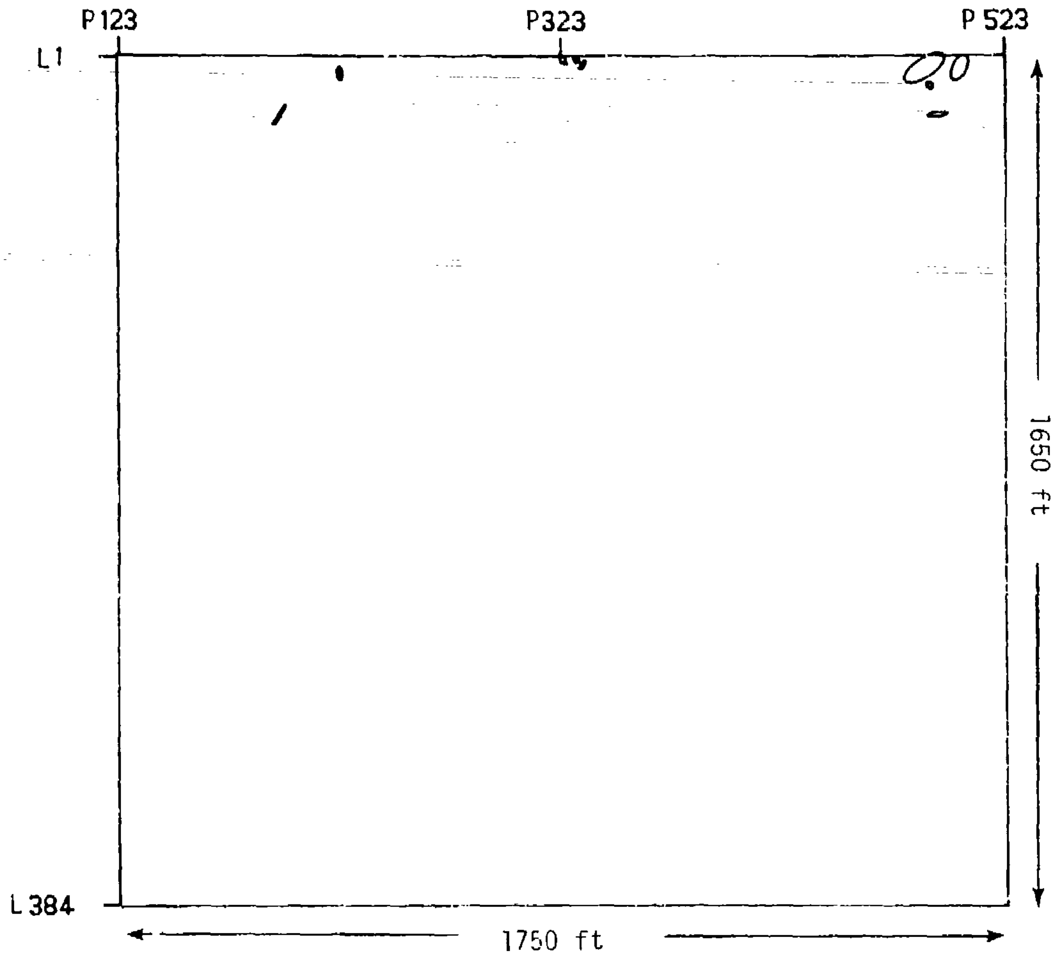
542 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	1
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	21
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	36
17	TO	20	55	TO	65	19
20	TO	22	65	TO	72	22
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	15
26	TO	28	85	TO	91	16
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	16
39	TO	45	127	TO	147	11
45	TO	55	147	TO	180	12
55	TO	71	180	TO	232	8
71	TO	100	232	TO	328	8
	OVER	100		OVER	328	9

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	2
1.0	TO	1.1	1
1.1	TO	1.2	11
1.2	TO	1.3	25
1.3	TO	1.4	27
1.4	TO	1.5	9
1.5	TO	1.6	26
1.6	TO	1.7	18
1.7	TO	1.8	21
1.8	TO	1.9	16
1.9	TO	2.0	6
2.0	TO	2.4	20
2.4	TO	2.6	6
2.6	TO	2.8	5
2.8	TO	3.0	1
3.0	TO	3.5	3
3.5	TO	4.0	0
4.0	TO	4.5	2
	OVER	4.5	3



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 275.44 Kelvin

Std. Dev. = σ = 0.26 Kelvin

EQUIVALENT ELLIPTICAL AREAS - SUNSET

CONIFERS (Sunset)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 9.0 - 11.4 μm
Mean = 275.44 Kelvin
σ = 0.26 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	2
10.0	TO	15.0	2
15.0	TO	20.0	2
20.0	TO	25.0	0
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	1
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 9

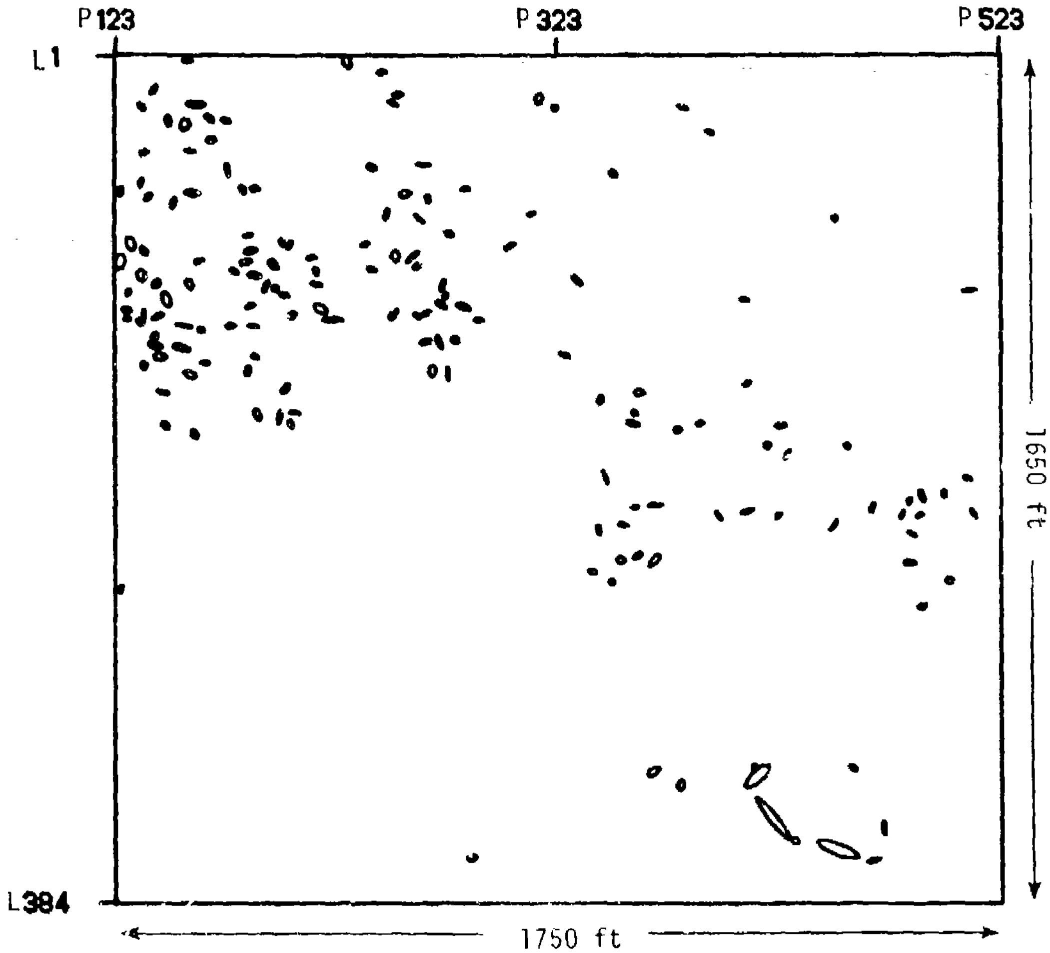
23 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	1
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	1
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	1
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	0
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	0
1.3	TO	1.4	1
1.4	TO	1.5	1
1.5	TO	1.6	1
1.6	TO	1.7	2
1.7	TO	1.8	0
1.8	TO	1.9	1
1.9	TO	2.0	0
2.0	TO	2.4	1
2.4	TO	2.6	1
2.6	TO	2.8	1
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 1.40 σ

Mean = 274.98 Kelvin

Std. Dev. = σ = 0.14 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

CONIFERS (Midnight)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.40 σ

Wavelength = 4.5 - 5.5 μm

Mean = 274.98 Kelvin

σ = 0.14 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	54
10.0 TO	15.0	63
15.0 TO	20.0	22
20.0 TO	25.0	11
25.0 TO	30.0	6
30.0 TO	35.0	3
35.0 TO	40.0	0
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	3
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 163

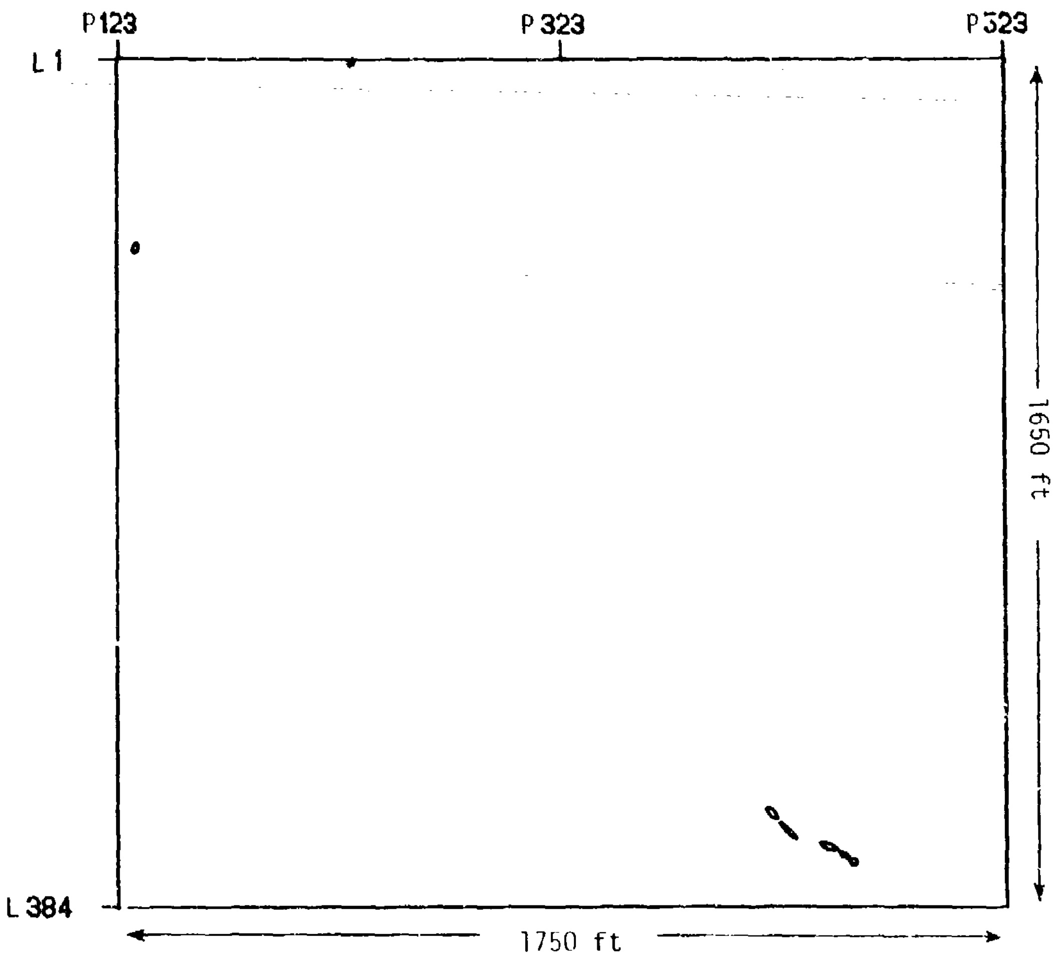
2422 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	15
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	29
17 TO 20	55 TO 65	36
20 TO 22	65 TO 72	18
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	9
26 TO 28	85 TO 91	15
28 TO 30	91 TO 98	6
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	22
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	7
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	1
OVER 100	OVER 328	3

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	2
1.2 TO 1.3	17
1.3 TO 1.4	12
1.4 TO 1.5	3
1.5 TO 1.6	20
1.6 TO 1.7	13
1.7 TO 1.8	31
1.8 TO 1.9	10
1.9 TO 2.0	10
2.0 TO 2.4	26
2.4 TO 2.6	10
2.6 TO 2.8	4
2.8 TO 3.0	2
3.0 TO 3.5	2
3.5 TO 4.0	1
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 274.98 Kelvin

Std. Dev. = σ = 0.14 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

CONIFERS (Midnight)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 274.98 Kelvin

σ = 0.14 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	0
10.0	TO	15.0	3
15.0	TO	20.0	1
20.0	TO	25.0	2
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 7

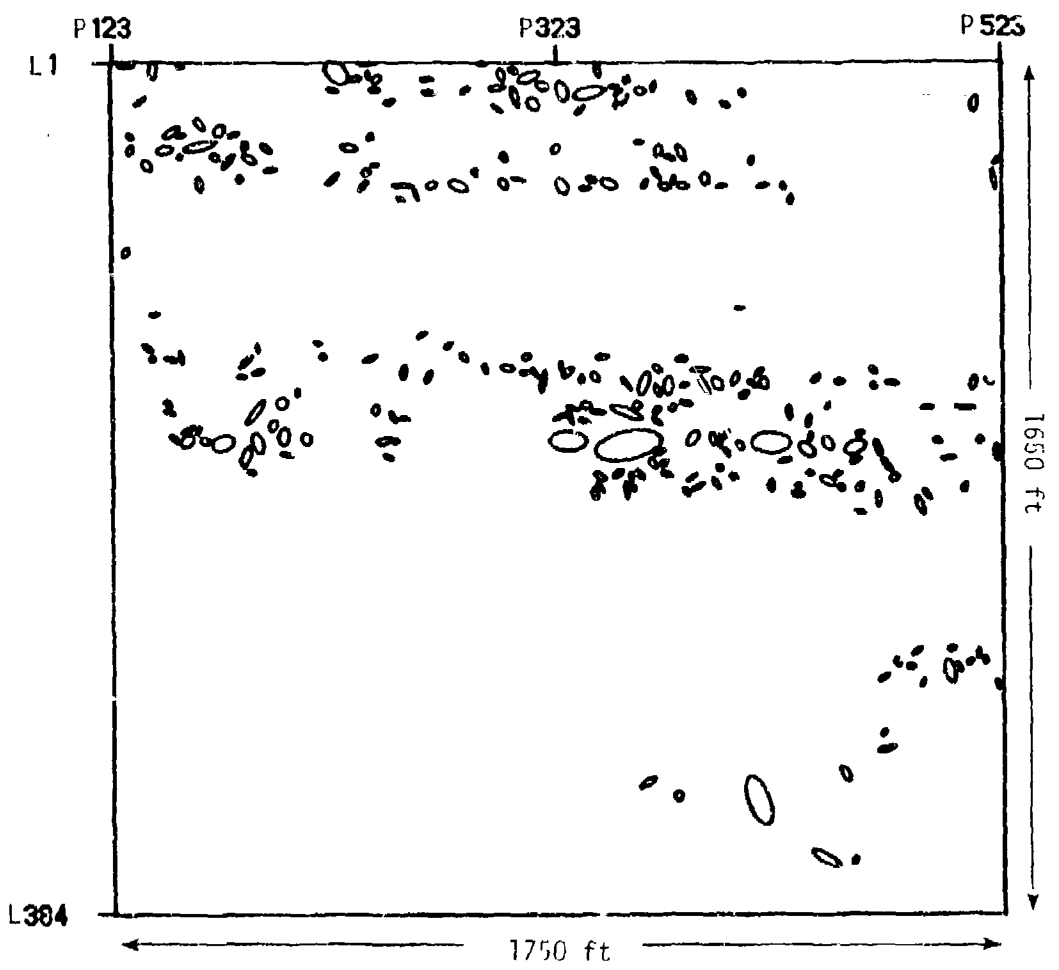
139 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	1
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	0
1.5 TO 1.6	1
1.6 TO 1.7	1
1.7 TO 1.8	1
1.8 TO 1.9	1
1.9 TO 2.0	1
2.0 TO 2.4	1
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.19 σ

Mean = 274.76 Kelvin

Std. Dev. = σ = 0.24 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

CONIFERS (Midnight)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.19 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.76 Kelvin

σ = 0.24 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	45
10.0 TO	15.0	80
15.0 TO	20.0	49
20.0 TO	25.0	32
25.0 TO	30.0	12
30.0 TO	35.0	11
35.0 TO	40.0	5
40.0 TO	45.0	6
45.0 TO	50.0	2
50.0 TO	75.0	12
75.0 TO	100.0	3
100.0 TO	150.0	1
150.0 TO	200.0	1
200.0 TO	250.0	1
250.0 TO	300.0	1
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 262

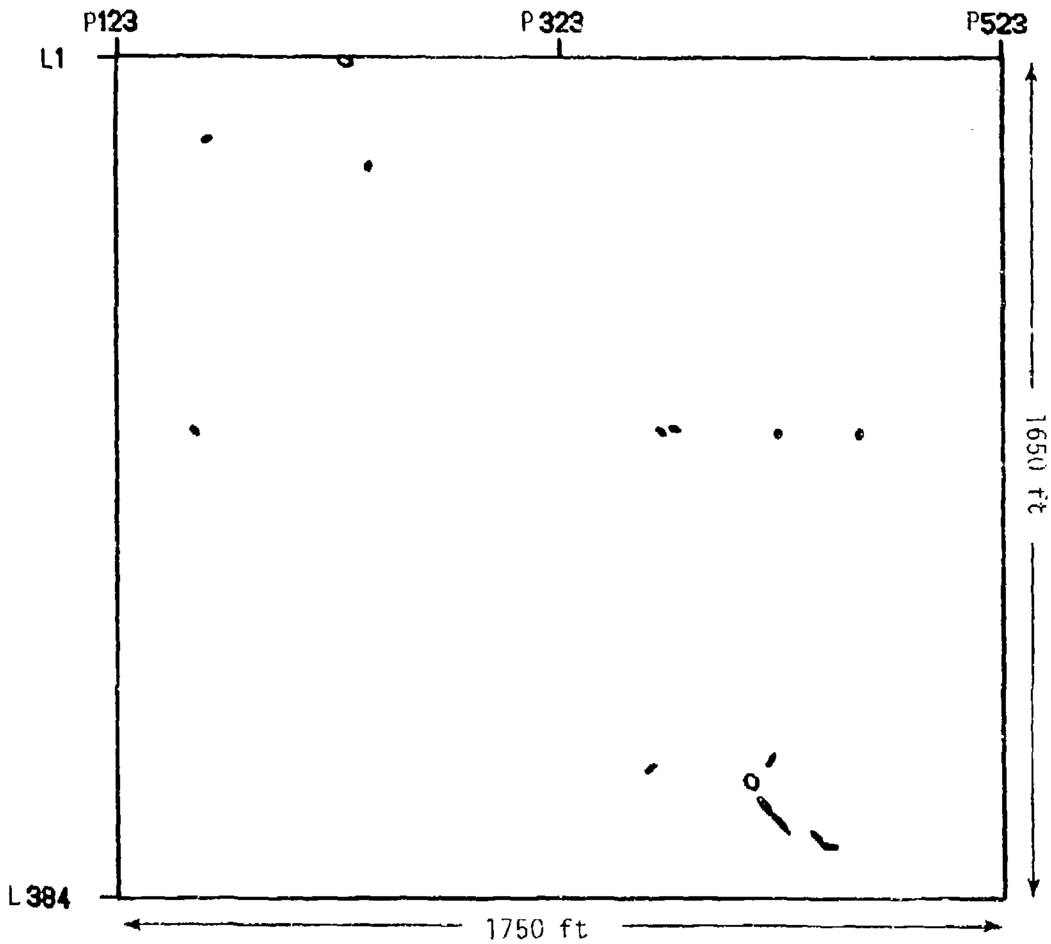
1188 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	13
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	31
17 TO 20	55 TO 65	45
20 TO 22	65 TO 72	25
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	27
26 TO 28	85 TO 91	20
28 TO 30	91 TO 98	16
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	29
39 TO 45	127 TO 147	16
45 TO 55	147 TO 180	17
55 TO 71	180 TO 232	6
71 TO 100	232 TO 328	10
OVER 100	OVER 328	7

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	4
1.2 TO 1.3	17
1.3 TO 1.4	17
1.4 TO 1.5	10
1.5 TO 1.6	30
1.6 TO 1.7	32
1.7 TO 1.8	37
1.8 TO 1.9	15
1.9 TO 2.0	25
2.0 TO 2.4	43
2.4 TO 2.6	9
2.6 TO 2.8	8
2.8 TO 3.0	5
3.0 TO 3.5	5
3.5 TO 4.0	2
4.0 TO 4.5	2
OVER 4.5	1



Area: Conifers (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.50 σ

Mean = 274.76 Kelvin

Std. Dev. = σ = 0.24 Kelvin

EQUIVALENT ELLIPTICAL AREAS - MIDNIGHT

CONIFERS (Midnight)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.76 Kelvin

σ = 0.24 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	5
10.0	TO	15.0	5
15.0	TO	20.0	1
20.0	TO	25.0	1
25.0	TO	30.0	1
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	1
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 15

199 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	3
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	2
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	2
39	TO	43	127	TO	147	1
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	1
OVER		100		OVER	328	0

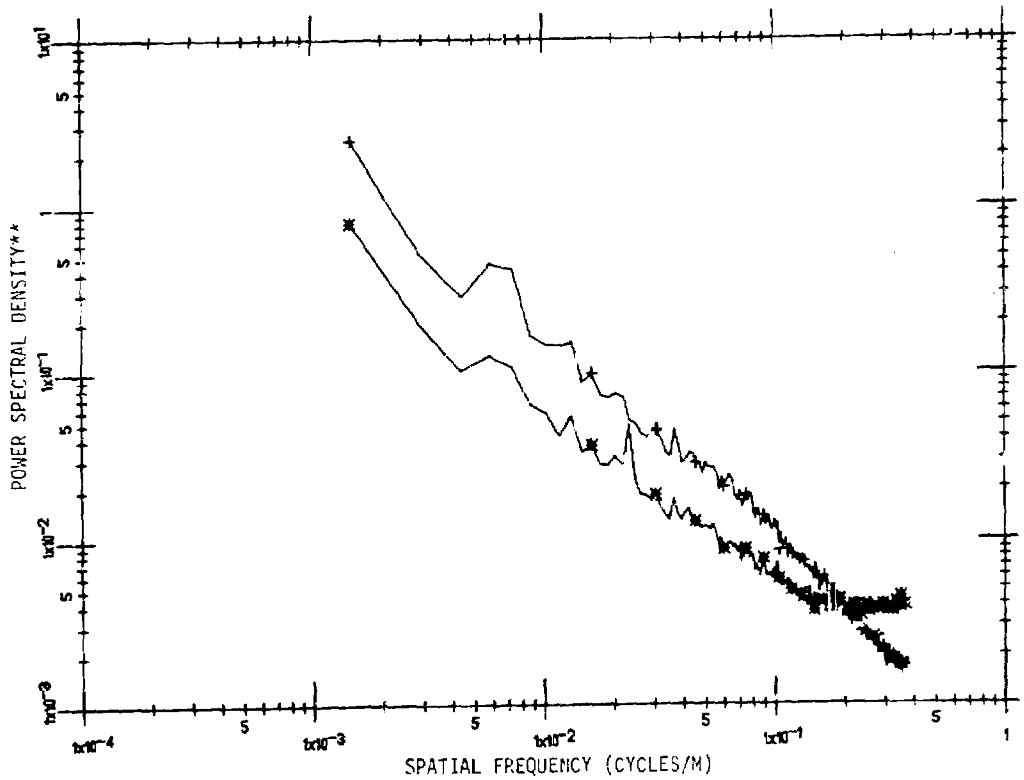
BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	1
1.2	TO	1.3	2
1.3	TO	1.4	2
1.4	TO	1.5	0
1.5	TO	1.6	1
1.6	TO	1.7	0
1.7	TO	1.8	3
1.8	TO	1.9	1
1.9	TO	2.0	2
2.0	TO	2.4	1
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0

MICHIGAN WINTER SCENE - CONIFERS

Power Spectra

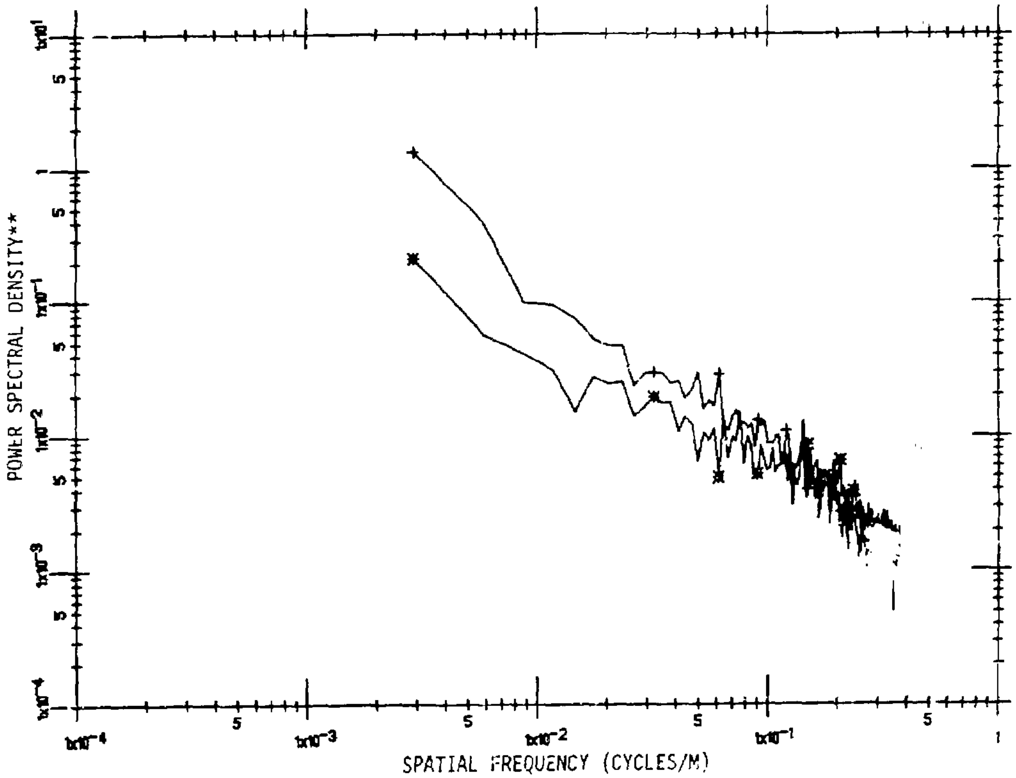
Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - PRE-DAWN (Angle: 90 Deg.)

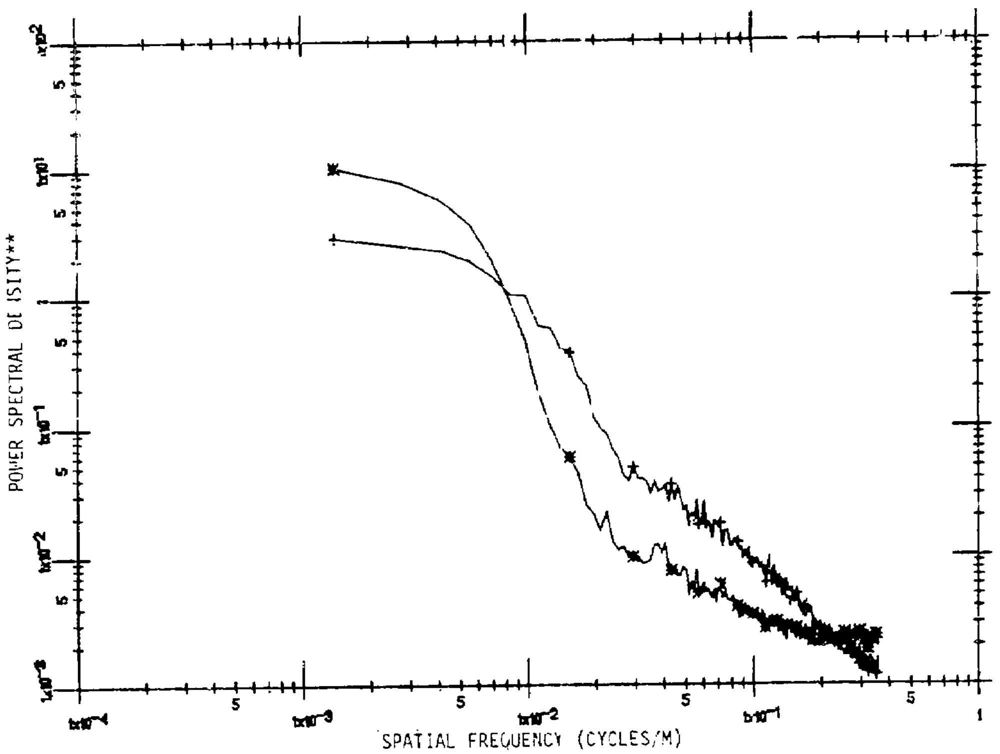
**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 um bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - PRE-DAWN (Angle: 90 Deg.)

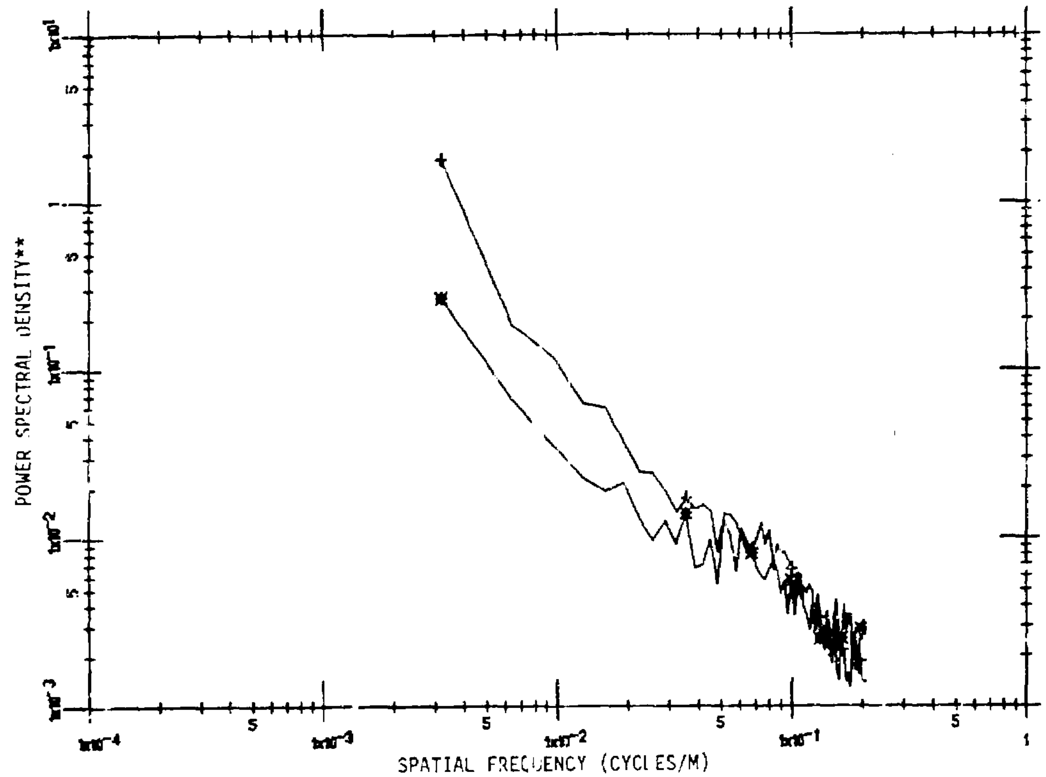
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - PRE-DAWN (Angle: 35 Deg.)

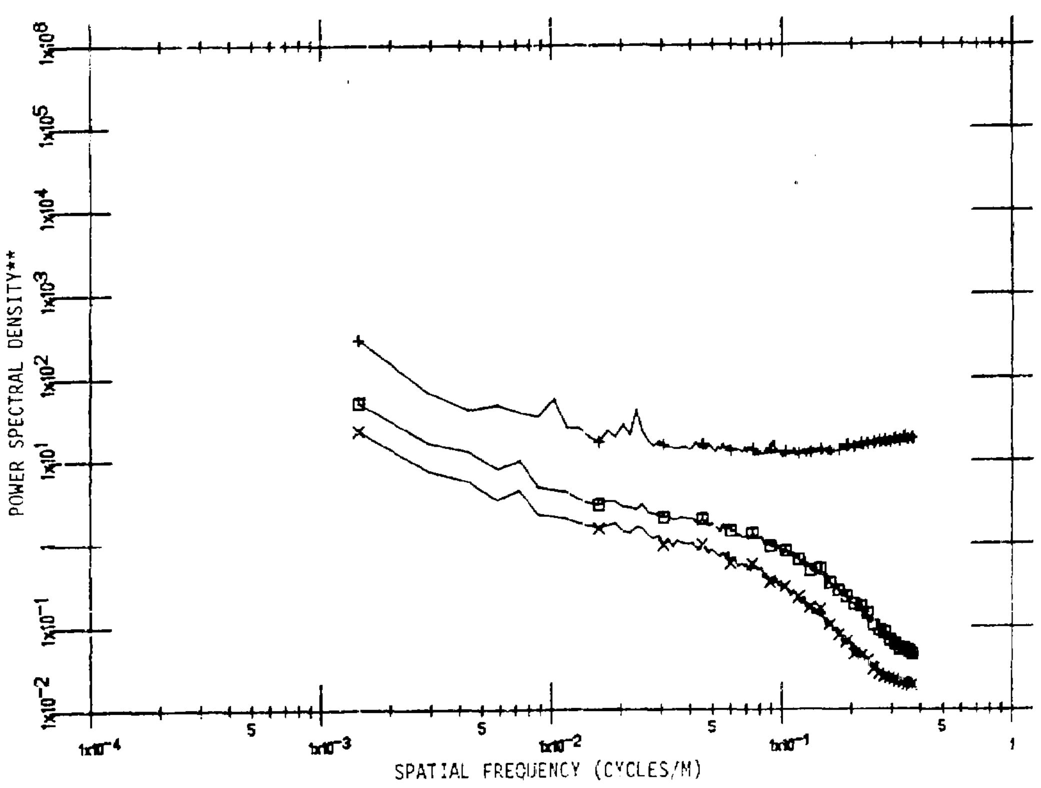
**Power spectral density is $(^\circ K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - PRE-DAWN (Angle: 35 Deg.)

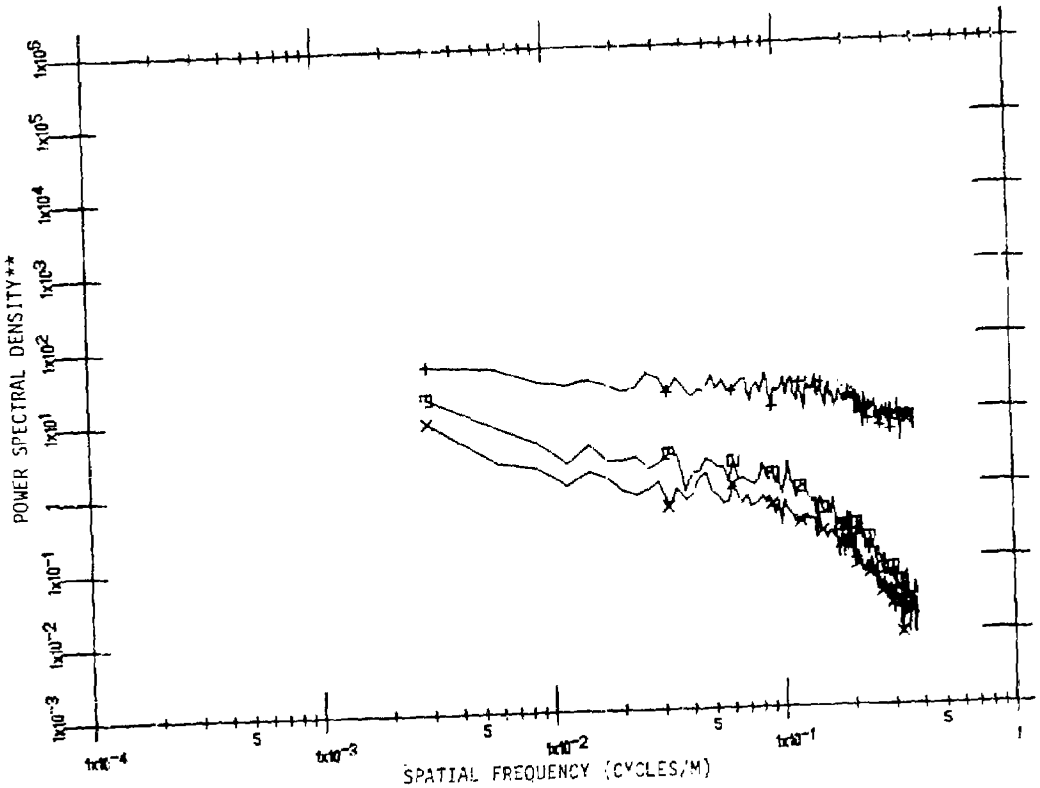
**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 µm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - NOON (Angle: 90 Deg.)

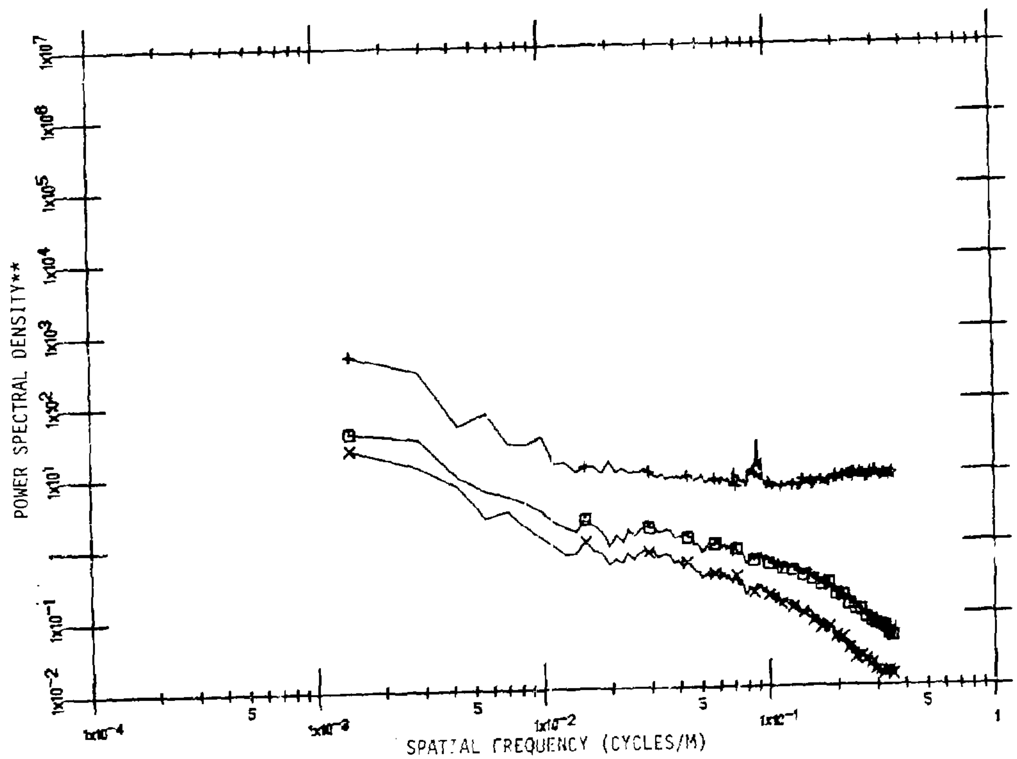
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 3.5 to 3.9, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - NOON (Angle: 90 Deg.)

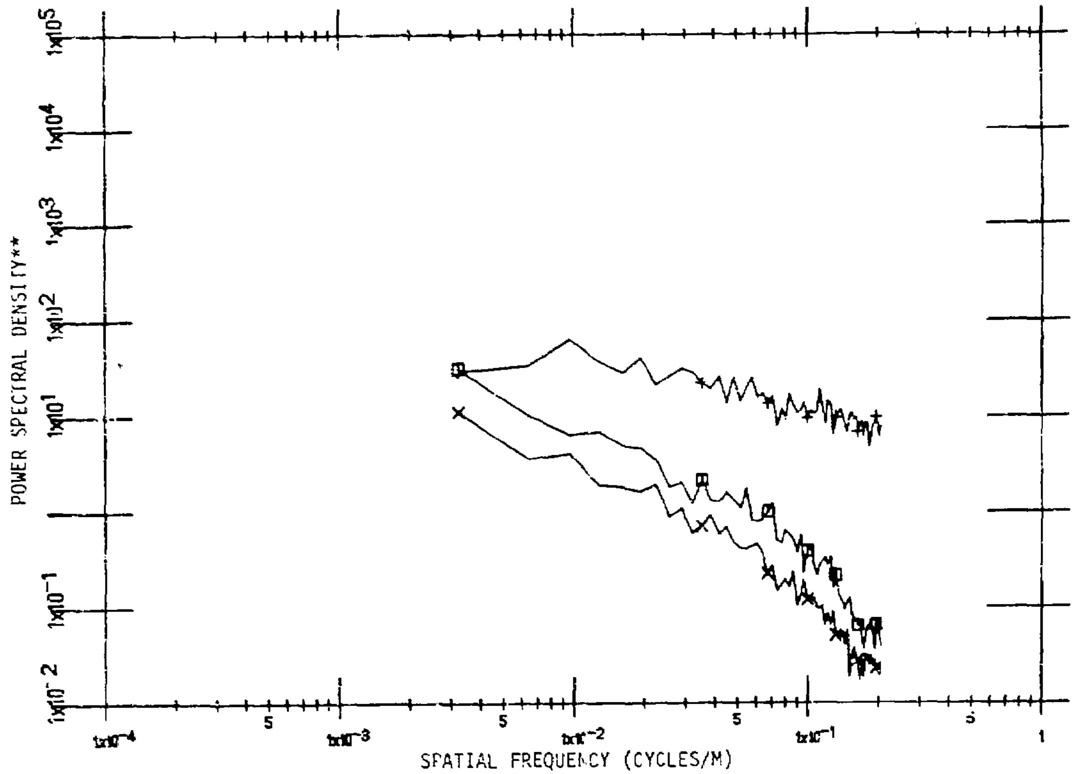
**Power spectral density is $(°K)^2$/cycle/meter for the 3.5 to 3.9, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - NOON (Angle: 35 Deg.)

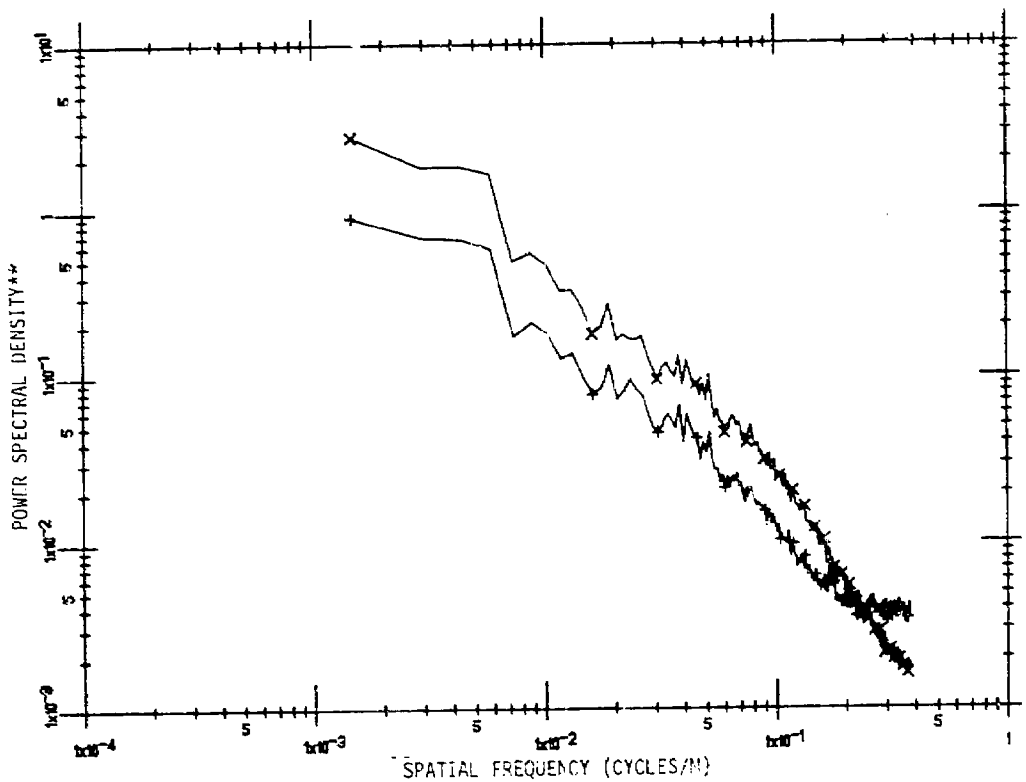
**Power spectral density is (°K)^2/cycle/meter for the 3.5 to 3.9, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - NOON (Angle: 35 Deg.)

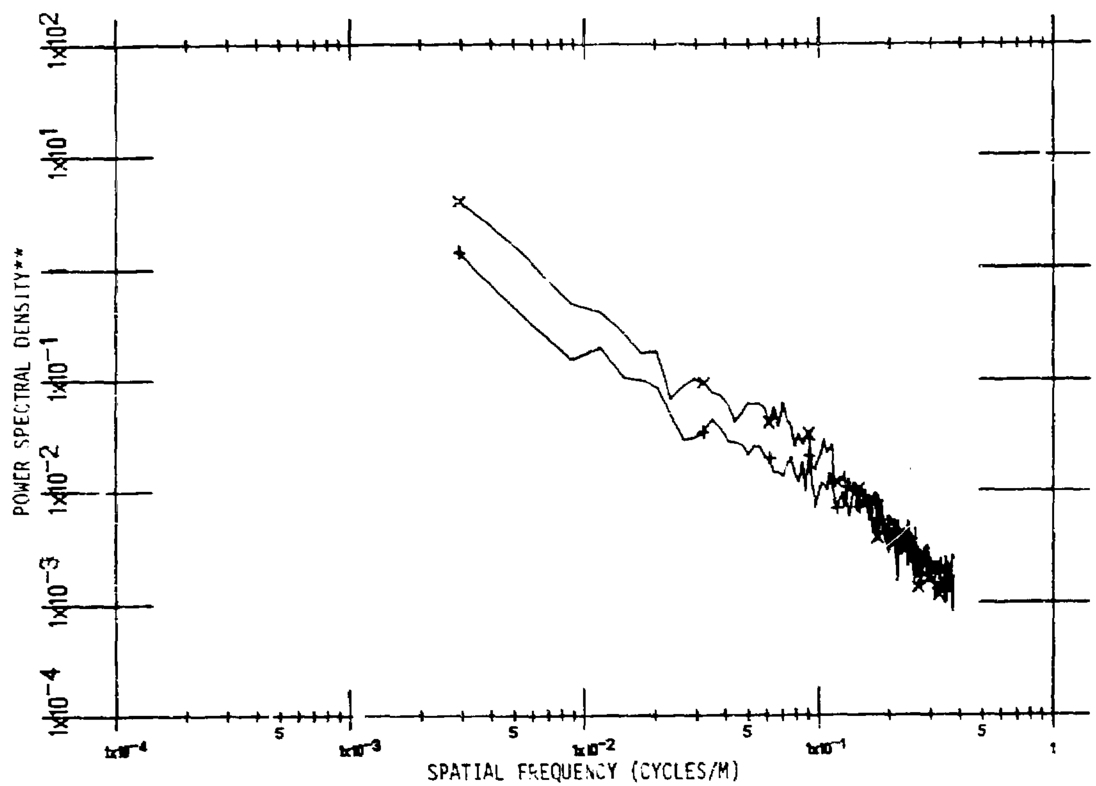
**Power spectral density is (°K)^2/cycle/meter for the 3.5 to 3.9, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - SUNSET (Angle: 90 Deg.)

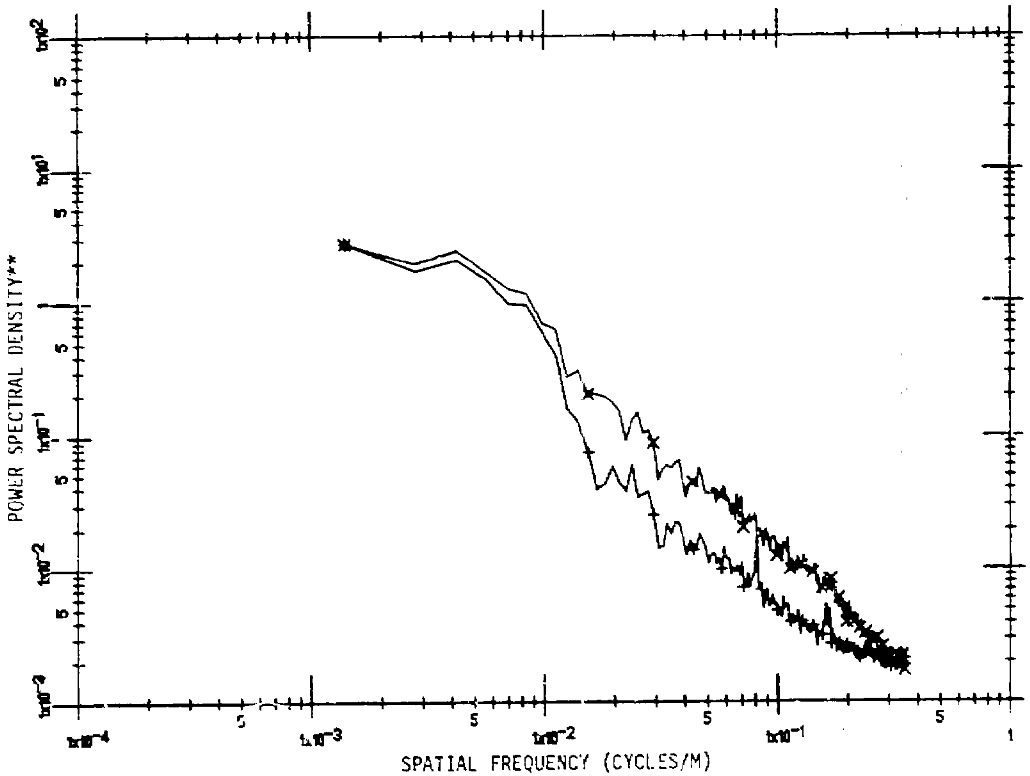
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 um bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - SUNSET (Angle: 90 Deg.)

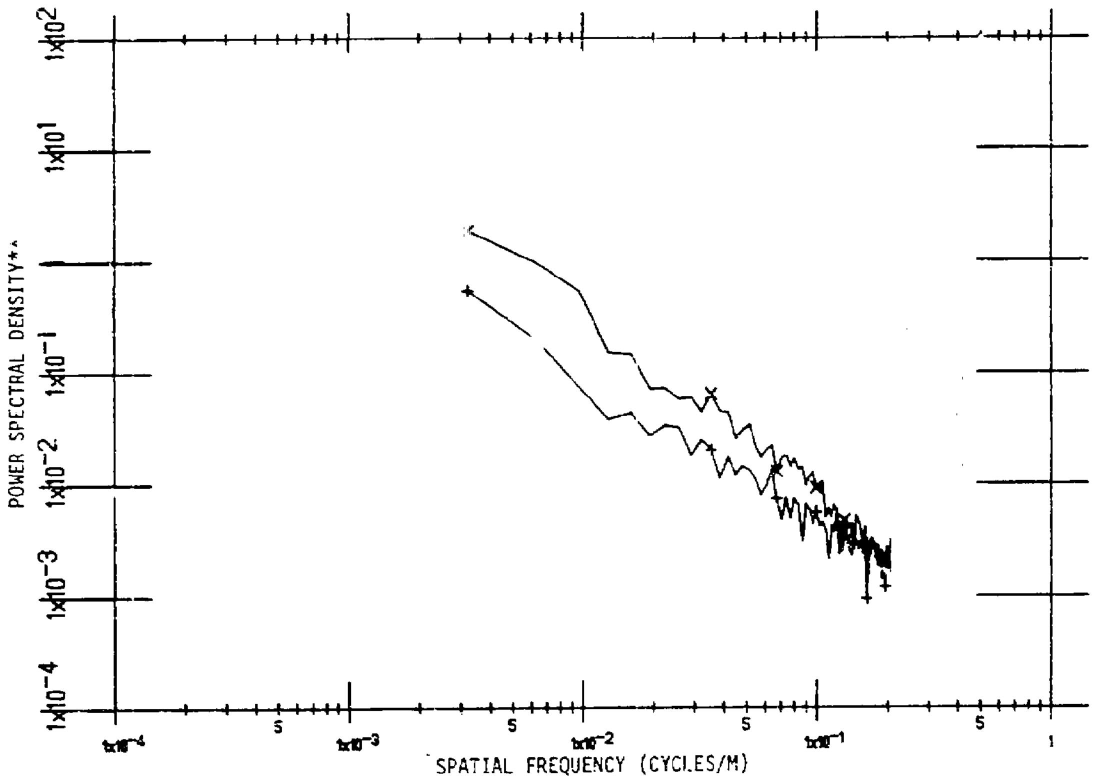
**Power spectral density is $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - SUNSET (Angle: 35 Deg.)

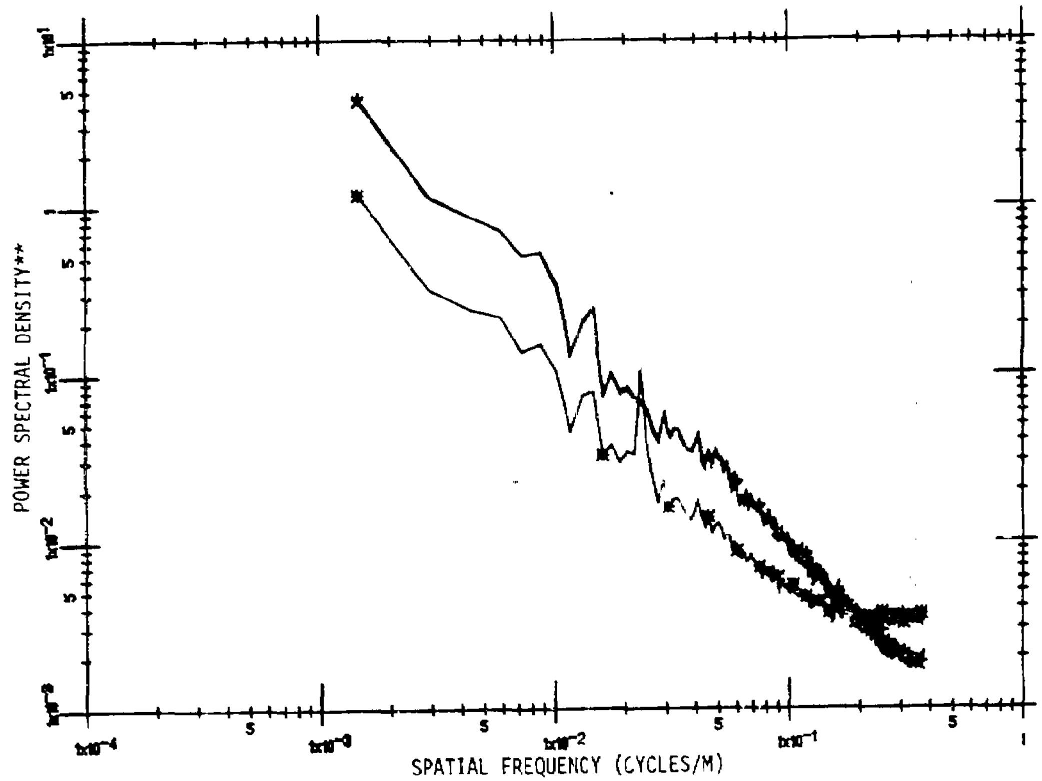
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - SUNSET (Angle: 35 Deg.)

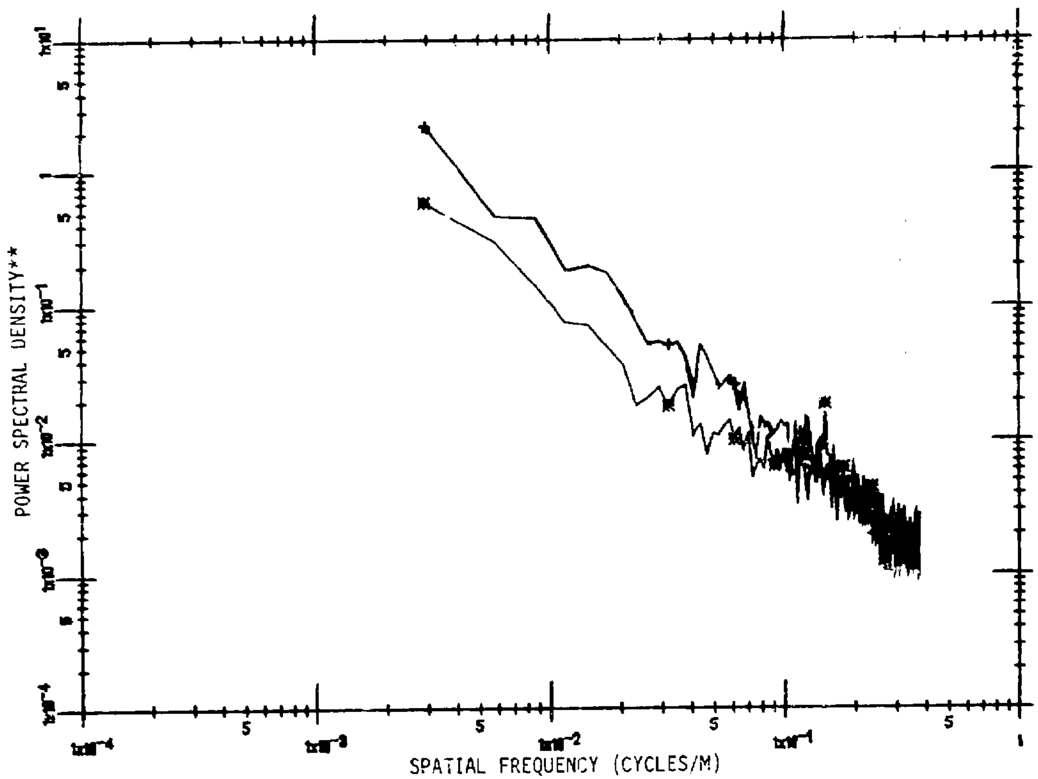
**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MIDNIGHT (Angle: 90 Deg.)

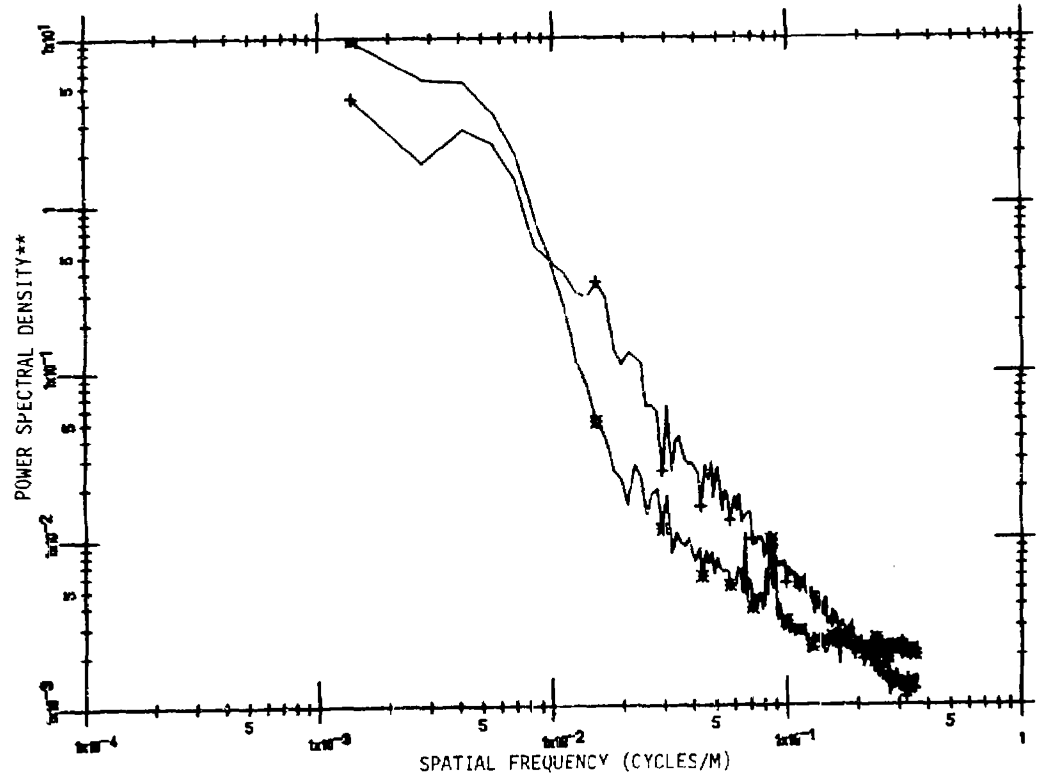
**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MIDNIGHT (Angle: 90 Deg.)

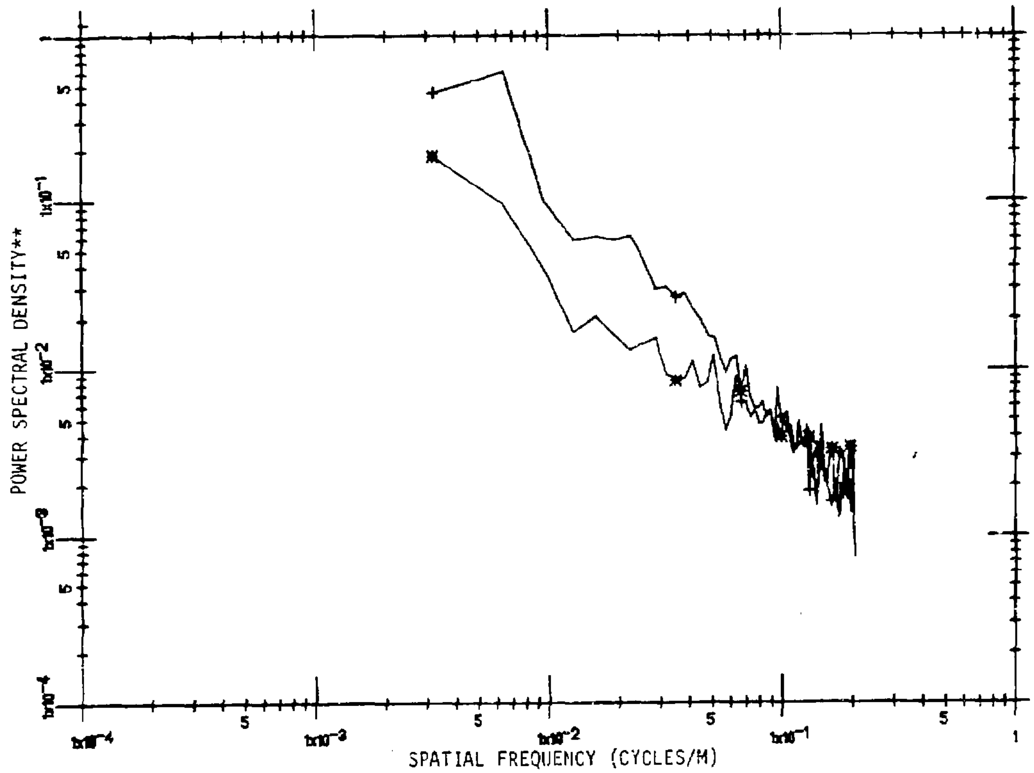
**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 µm bands.



Area: CONIFERS CROSS-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MIDNIGHT (Angle: 35 Deg.)

**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: CONIFERS IN-TRACK Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MIDNIGHT (Angle: 35 Deg.)

**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 µm bands.

MICHIGAN WINTER SCENE - FARMLAND

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands

Spectral Bands:	Channel 8:	3.5 - 3.9 μm (°K)
	Channel 10:	4.5 - 5.5 μm (°K)
	Channel 12:	9.0 - 11.4 μm (°K)

FARMLAND - PRE-DAWN

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.765	1.000

Channels	10	12
Mean	2.7455E+02	2.7407E+02
Standard Deviation	1.4660E-01	2.2202E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.840	1.000

Channels	10	12
Mean	2.7445E+02	2.7407E+02
Standard Deviation	1.5195E-01	2.4940E-01
Total Points	84400.	84400.

FARMLAND - NOON

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 8 (3.5 - 3.9 μm)
10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 385

Correlation	8	10	12
8	1.000		
10	0.174	1.000	
12	0.266	0.607	1.000

Channels	8	10	12
Mean	2.7966E+02	2.7662E+02	2.7723E+02
Standard Deviation	4.2649E+00	9.4517E-01	1.2254E+00
Total Points	153200.	153200.	153200.

35° Depression

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 211

Correlation	8	10	12
8	1.000		
10	0.315	1.000	
12	0.396	0.687	1.000

Channels	8	10	12
Mean	2.8104E+02	2.7736E+02	2.7791E+02
Standard Deviation	3.4479E+00	1.0462E+00	1.4930E+00
Total Points	83600.	83600.	83600.

FARMLAND - SUNSET

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.744	1.000

Channels	10	12
Mean	2.7501E+02	2.7479E+02
Standard Deviation	2.8952E-01	4.0305E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.844	1.000

Channels	10	12
Mean	2.7502E+02	2.7470E+02
Standard Deviation	2.9582E-01	4.5508E-01
Total Points	84400.	84400.

FARMLAND - MIDNIGHT

Number of Subregions:	1
Line Increment Used:	1
Pixel Increment Used:	1
Correlation Channels:	10 (4.5 - 5.5 μm)
	12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At:	123	523
Line Subarea Divisions At:	1	385

Correlation	10	12
10	1.000	
12	0.871	1.000

Channels	10	12
Mean	2.7466E+02	2.7416E+02
Standard Deviation	2.2886E-01	3 6454E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At:	123	523
Line Subarea Divisions At:	1	211

Correlation	10	12
10	1.000	
12	0.905	1.000

Channels	10	12
Mean	2.7475E+02	2.7433E+02
Standard Deviation	1.9049E-01	3.2901E-01
Total Points	84400.	84400.

ΣERIM

MICHIGAN WINTER SCENE - FARMLAND

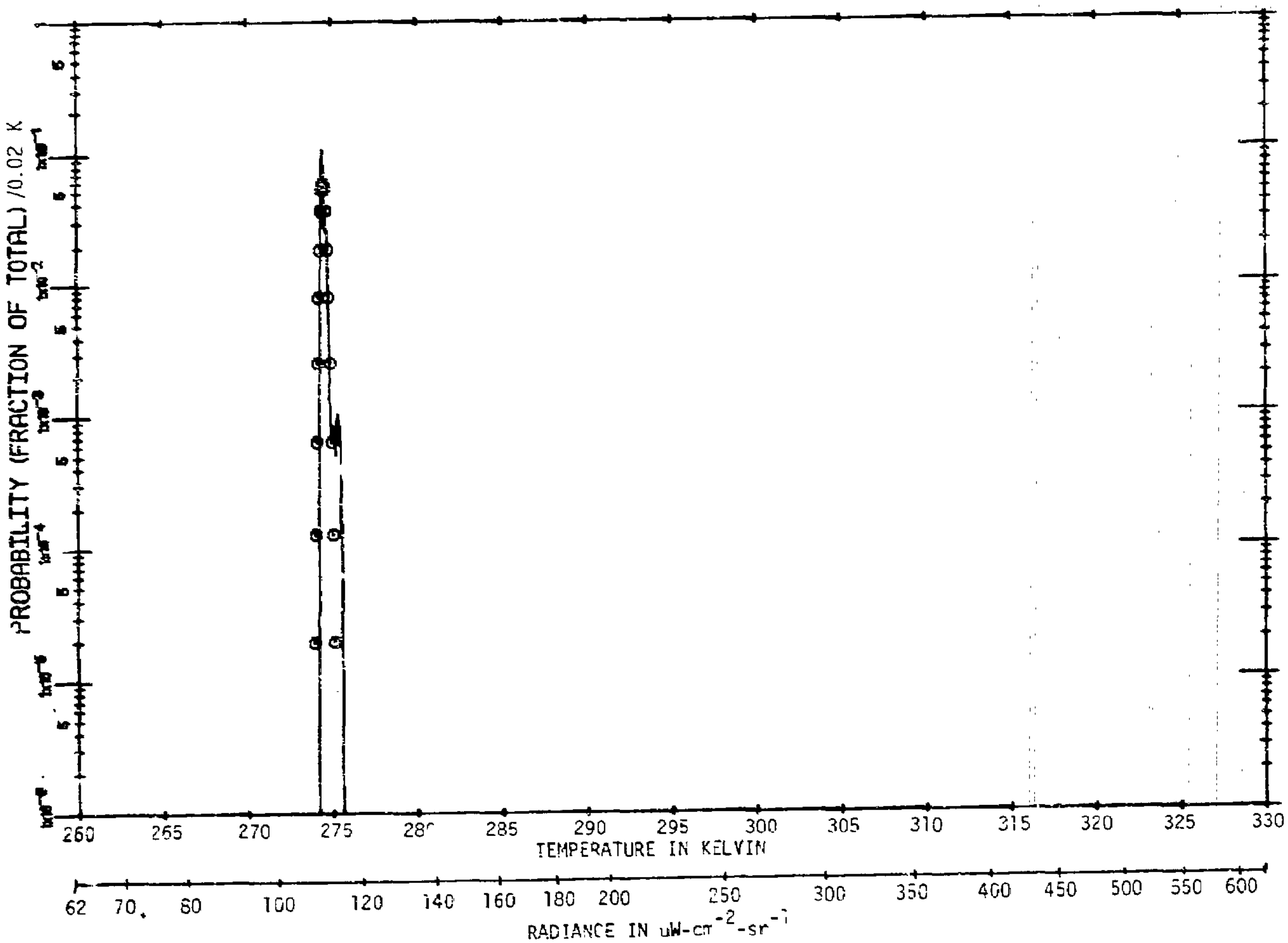
Histograms*

Spectral Bands: 3.5 - 3.9 μm

4.5 - 5.5 μm

9.0 - 11.4 μm

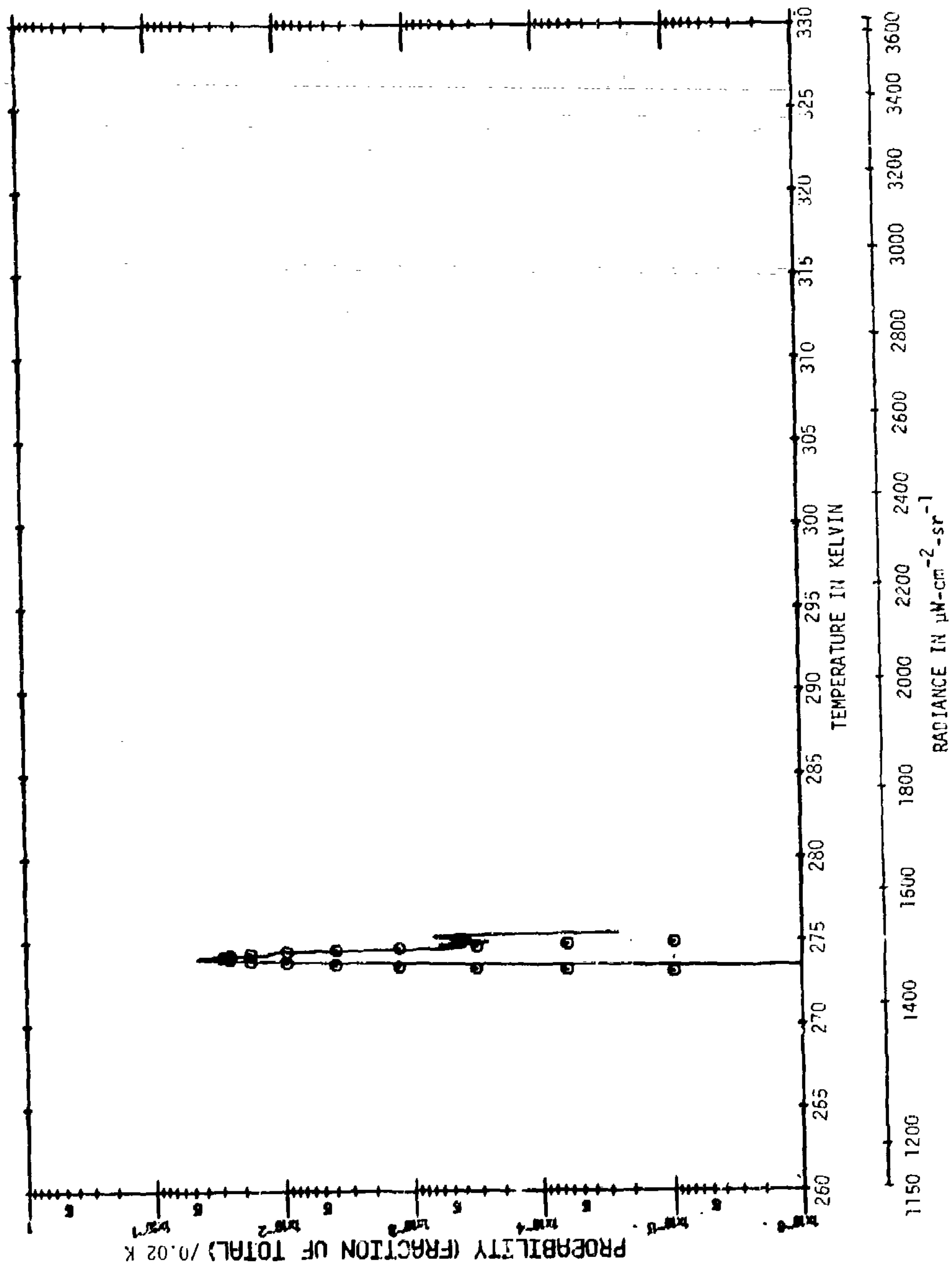
* Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



Area: FARMLAND Wavelength = 4.5 - 5.5 μm
Mean = 274.55
Std. Dev. = 0.15

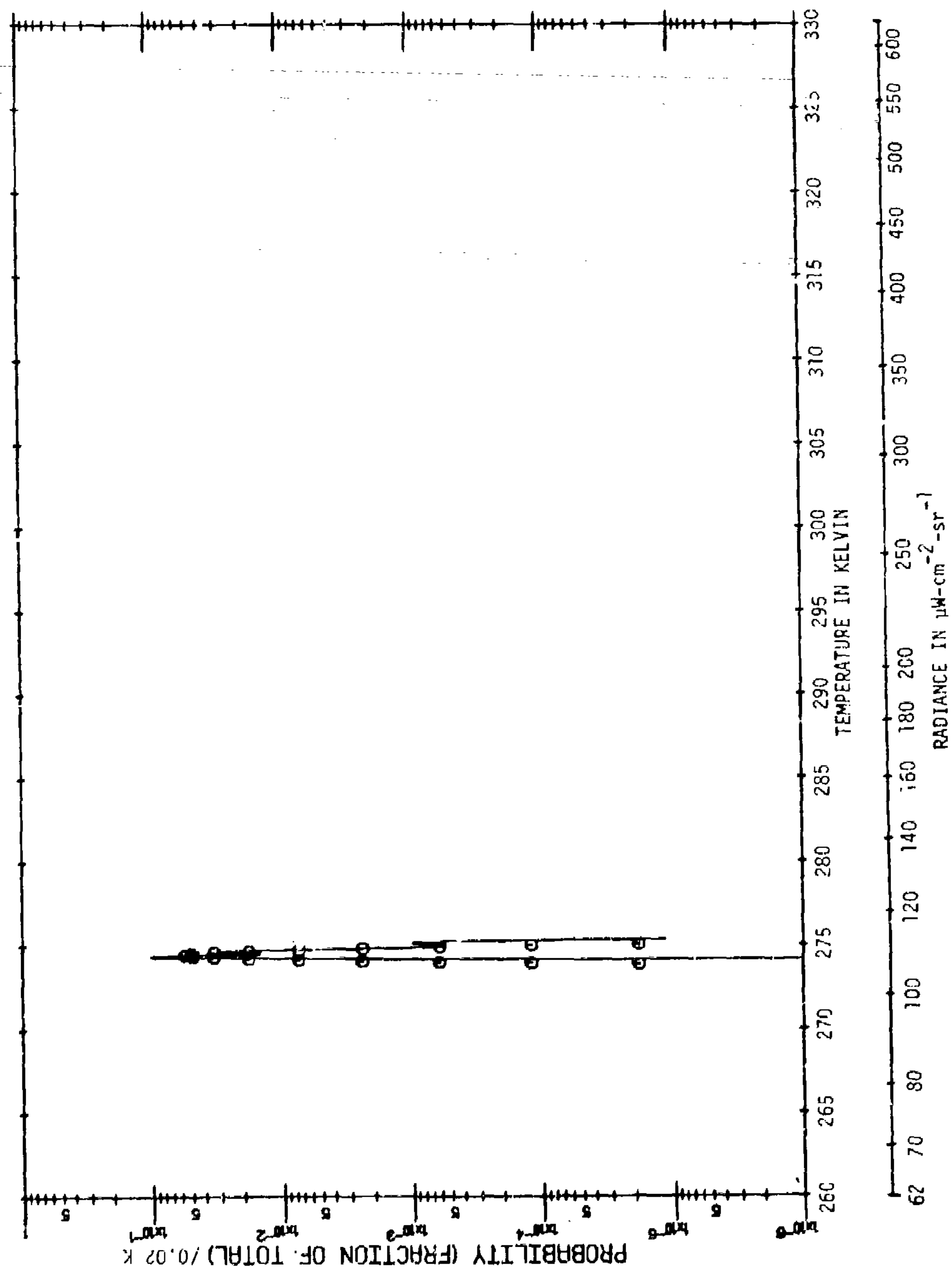
PRE-DAWN (ANGLE: 90 DEG.)

ERIM



Area: FARMLAND Wavelength = 9.0 - 11.4 µm
Mean = 274.07
Std. Dev. = 0.22

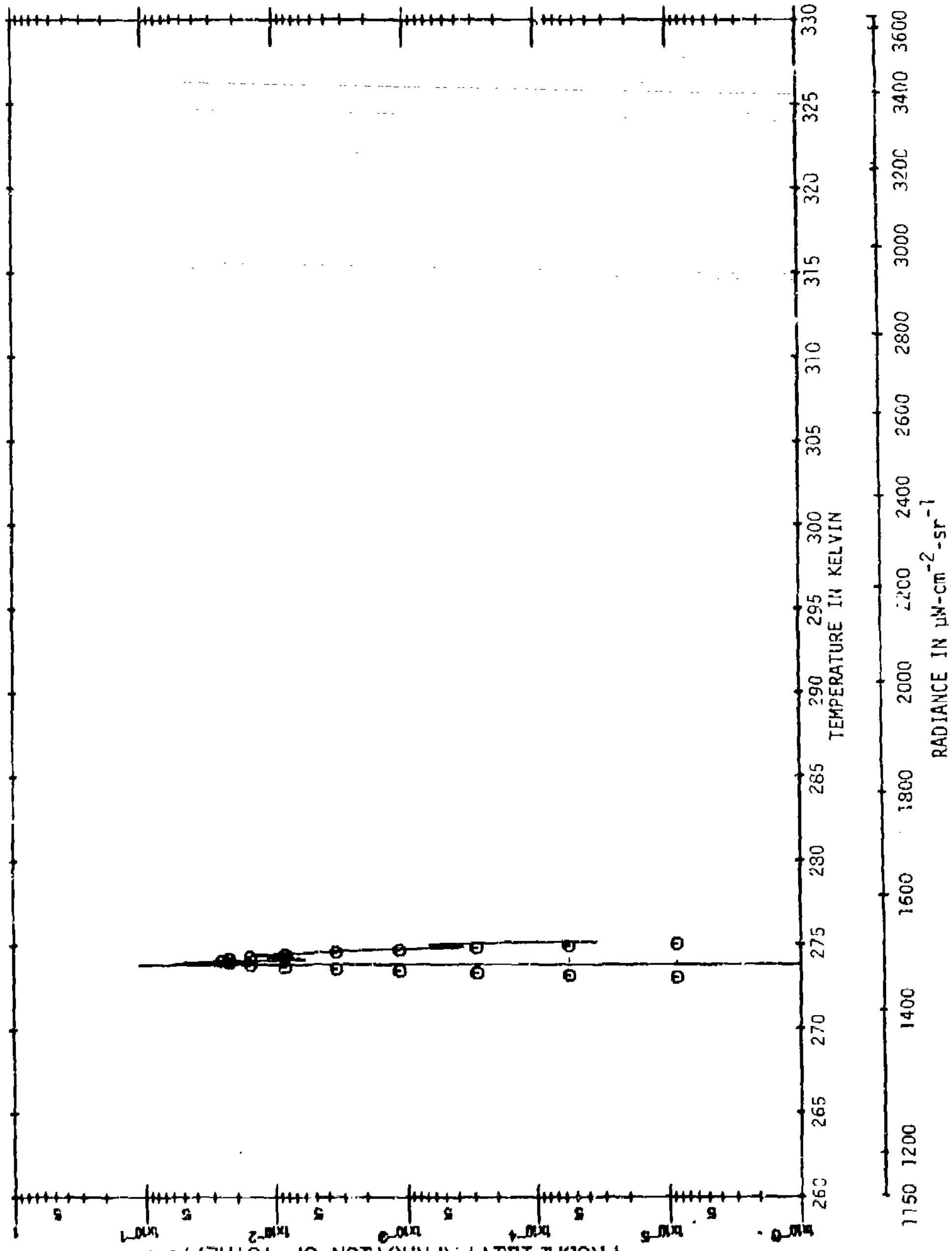
PRE-DAWN (ANGLE: 90 DEG.)



Area: FARMLAND Wavelength = 4.5 - 5.5 μm
Mean = 274.45
Std. Dev. = 0.15

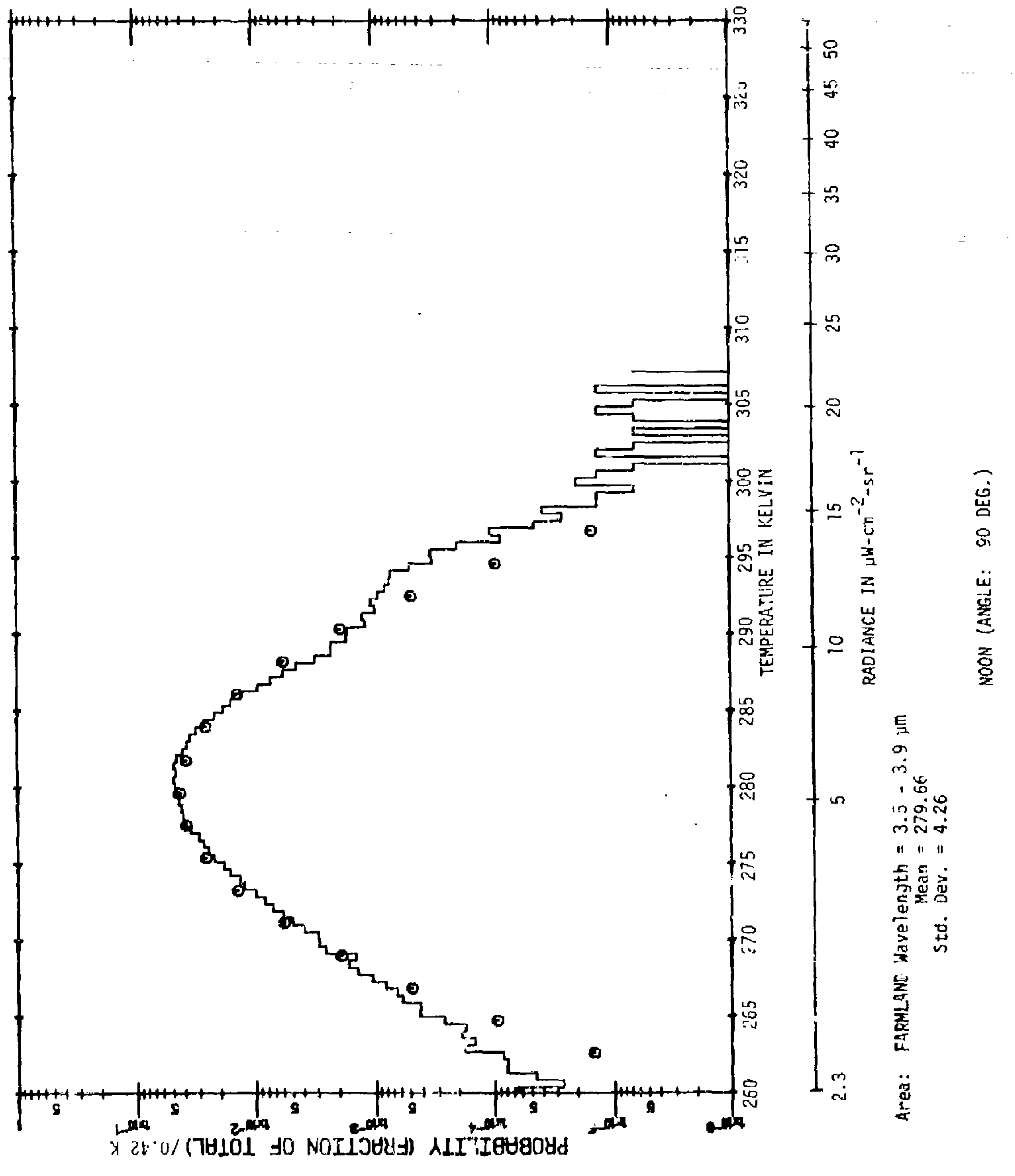
PRE-DAWN (ANGLE: 35 DEG.)

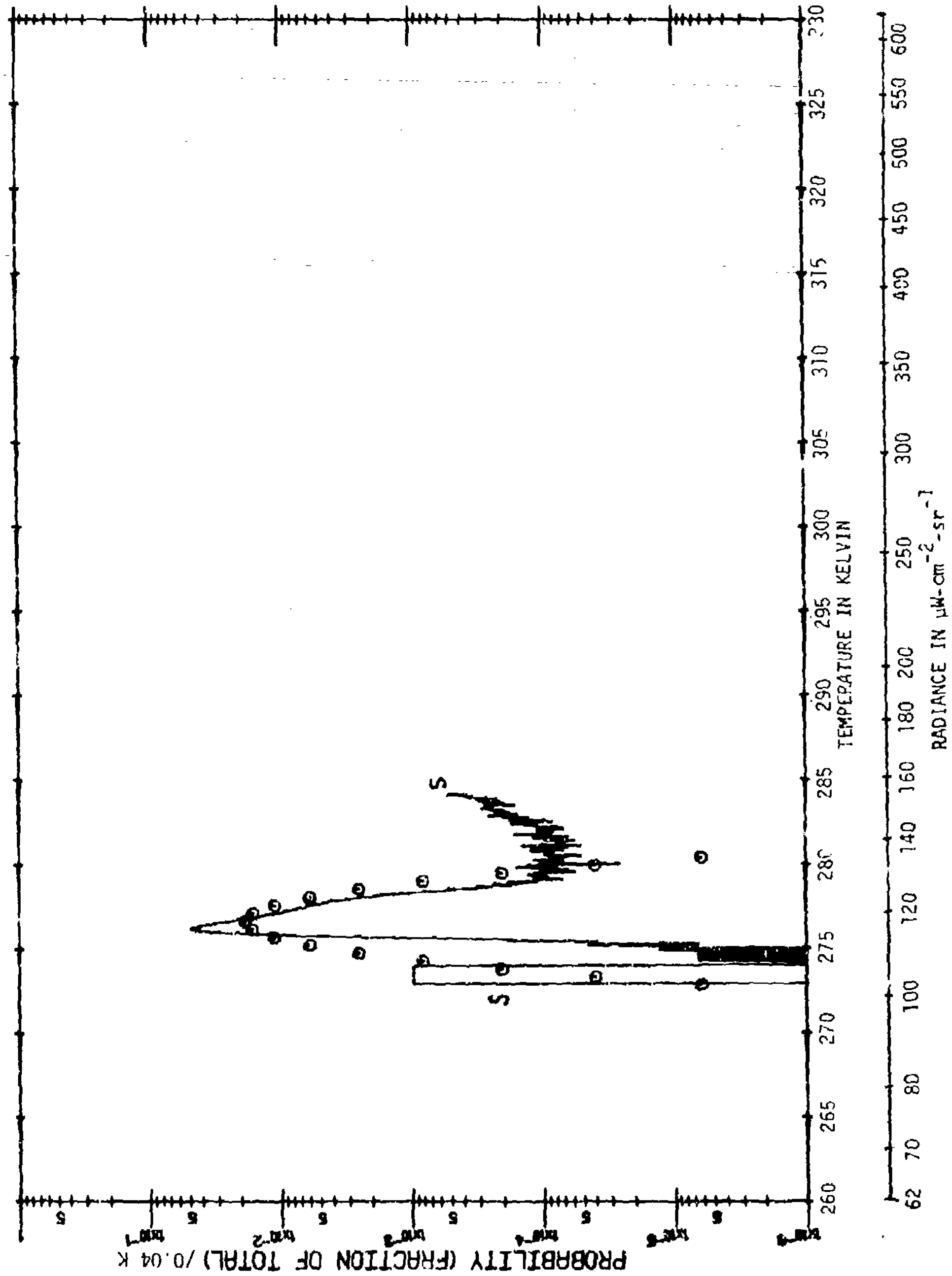
ERIM



Area: FARMLAND Wavelength = 9.0 - 11.4 μm
Mean = 274.07
Std. Dev. = 0.25

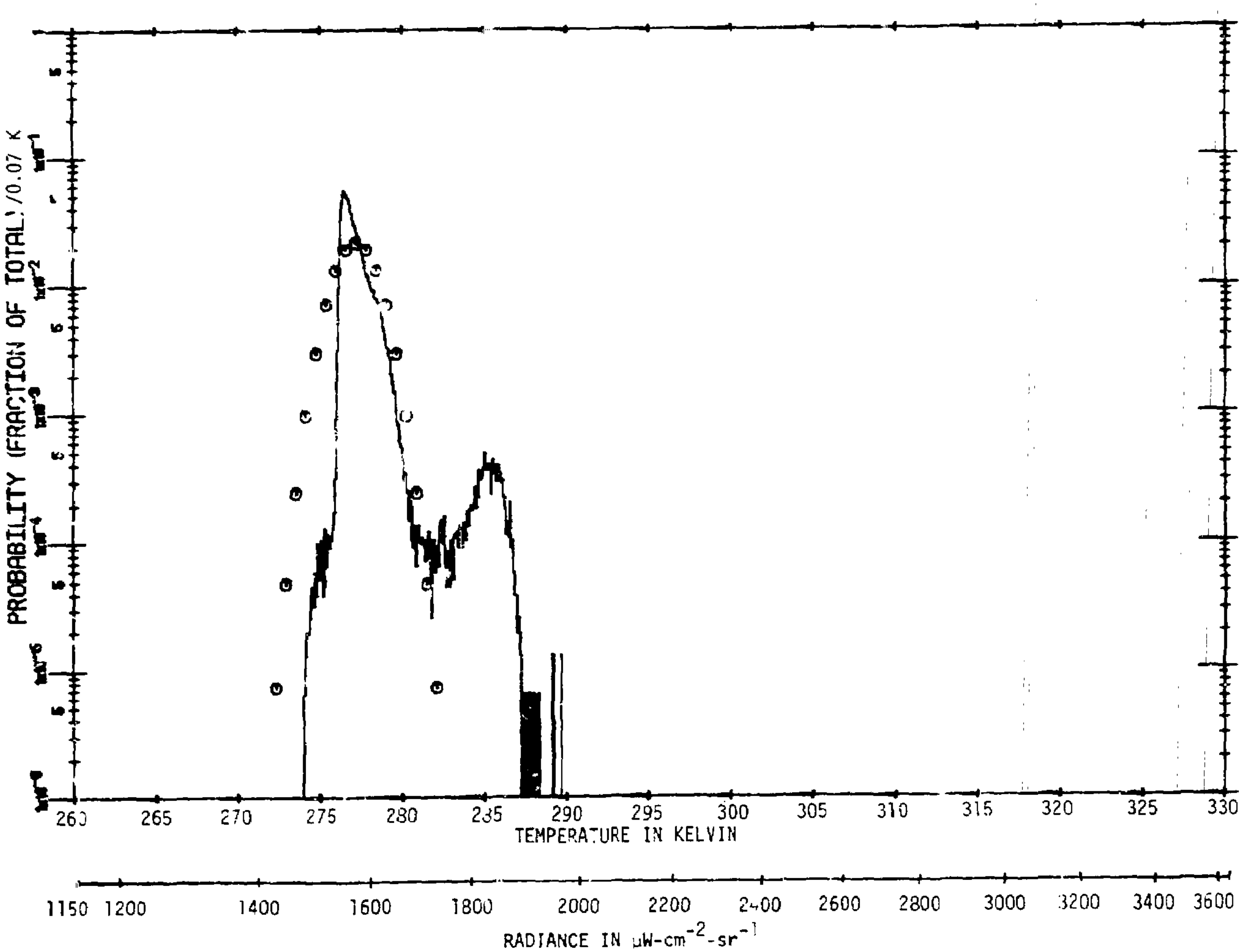
PRE-DAWN (ANGLE: 35 DEG.)


PROBABILITY (FRACTION OF TOTAL)/0.12 K
TEMPERATURE IN KELVIN
260
265
270
275
280
285
290
295
300
305
310
315
320
325
330
RADIANCE IN μW-cm^{-2}-sr^{-1}
2.3
5
10
15
20
25
30
35
40
45
50
Area: FARMLAND Wavelength = 3.5 - 3.9 µm
Mean = 279.66
Std. Dev. = 4.26
NOON (ANGLE: 90 DEG.)



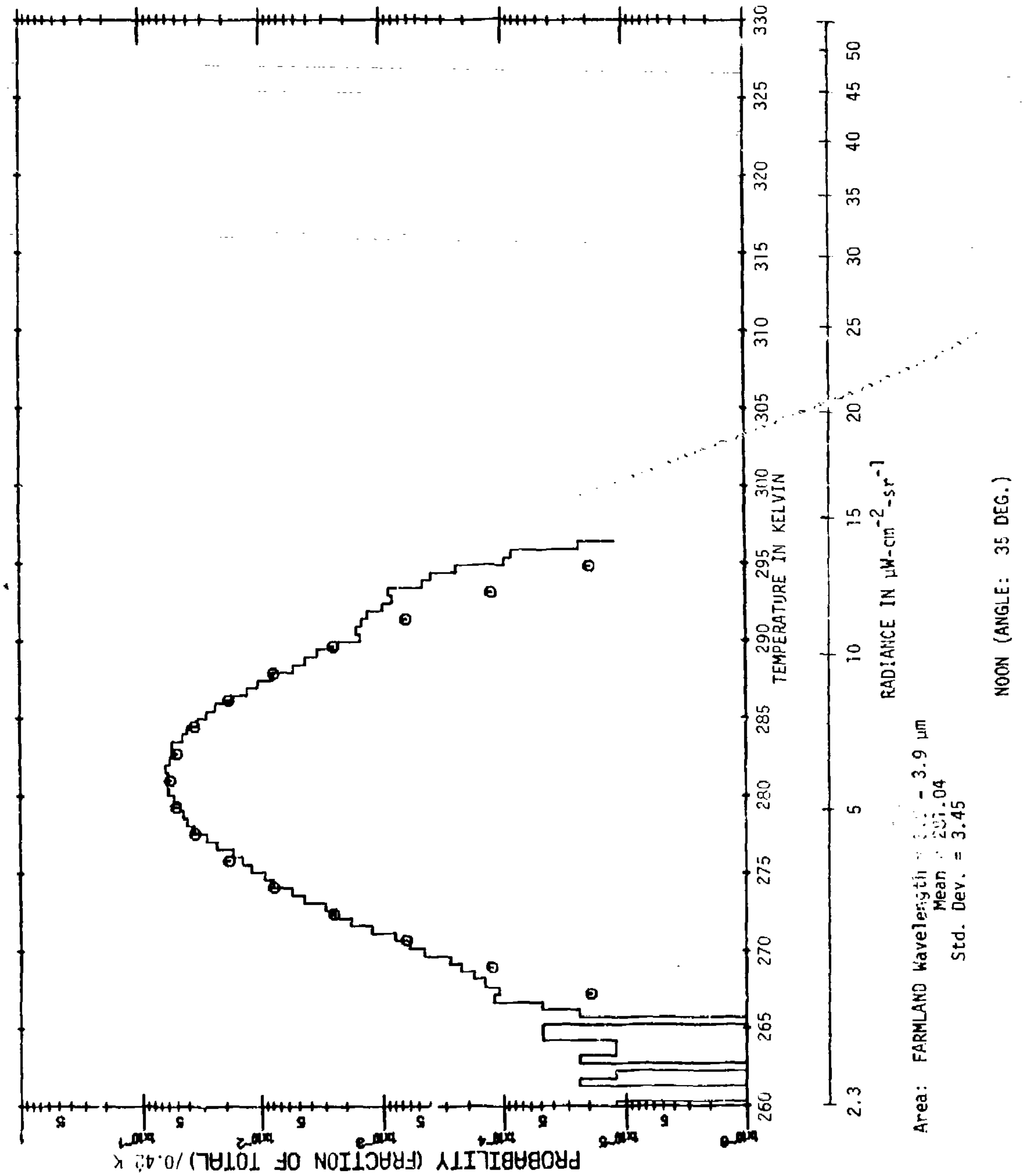
Area: FARMLAND Wavelength = 4.5 - 5.5 µm
Mean = 276.62
Std. Dev. = 0.95

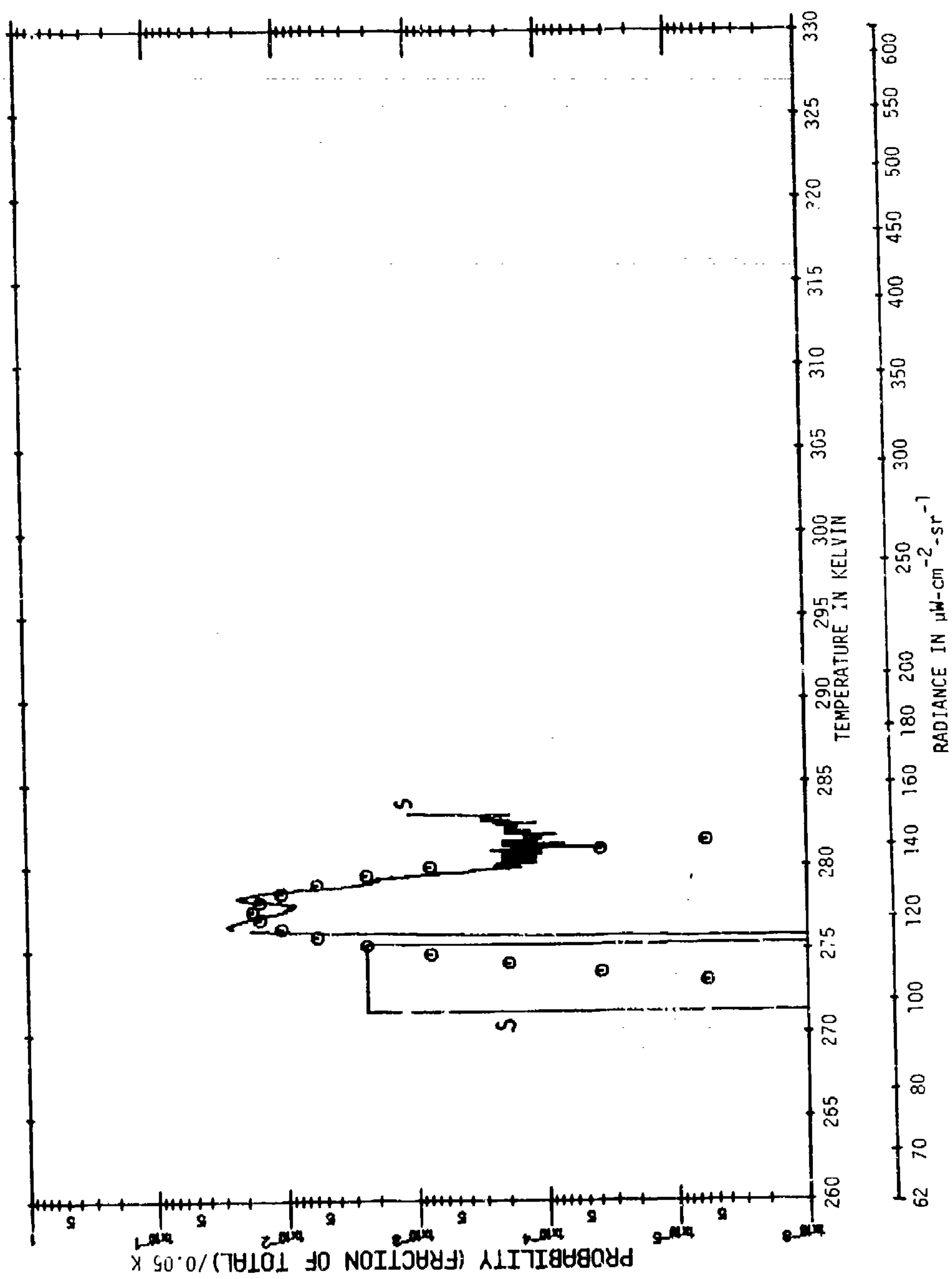
NOON (ANGLE: 90 DEG.)



Area: FARMLAND Wavelength = 9.0 - 11.4 μm
Mean = 277.23
Std. Dev. = 1.23

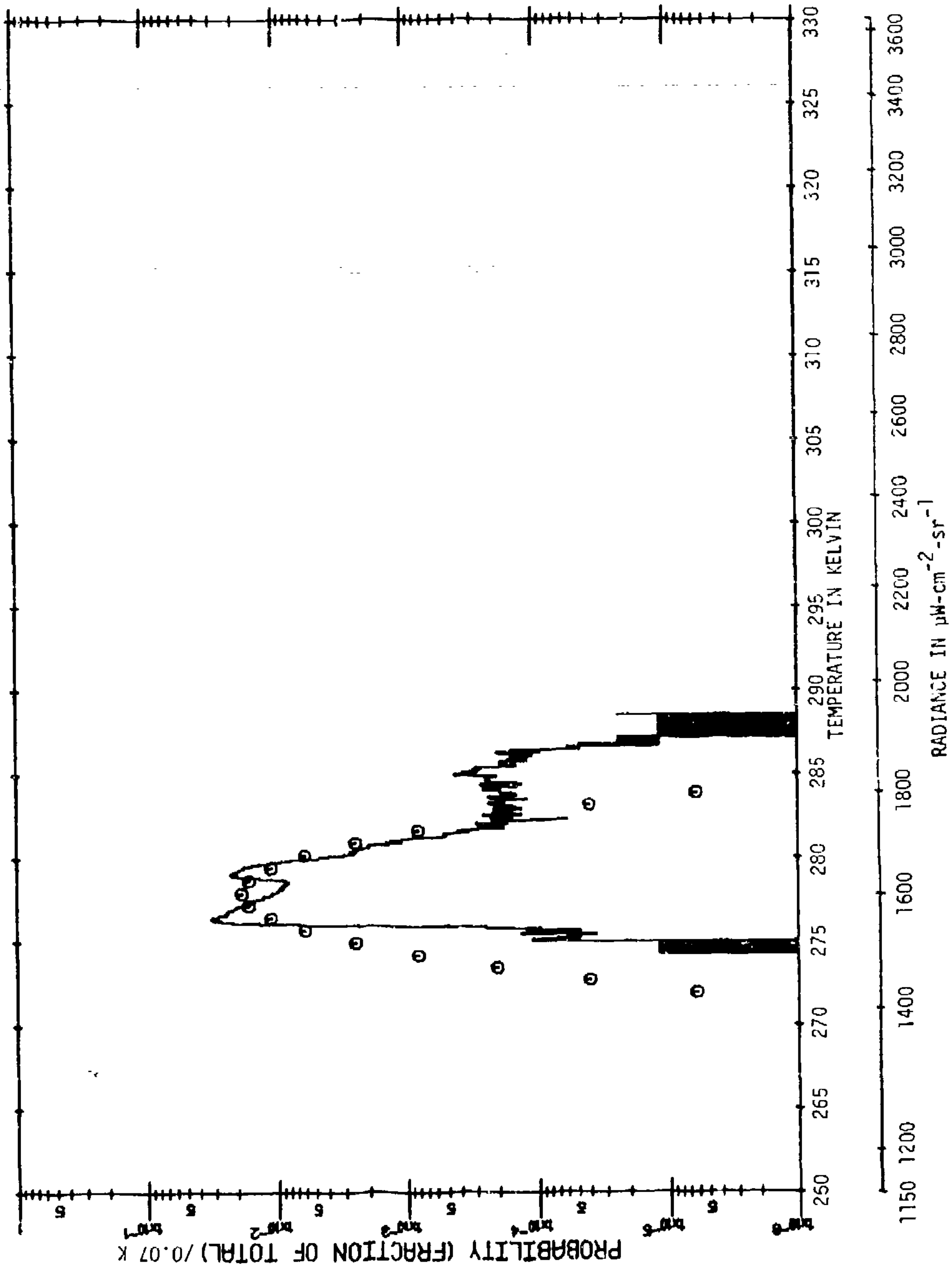
NOON (ANGLE: 90 DEG.)


PROBABILITY (FRACTION OF TOTAL)
TEMPERATURE IN KELVIN
RADIANCE IN μW-cm^{-2}-sr^{-1}
NOON (ANGLE: 35 DEG.)
Area: FARMLAND
Std. Dev. = 3.45



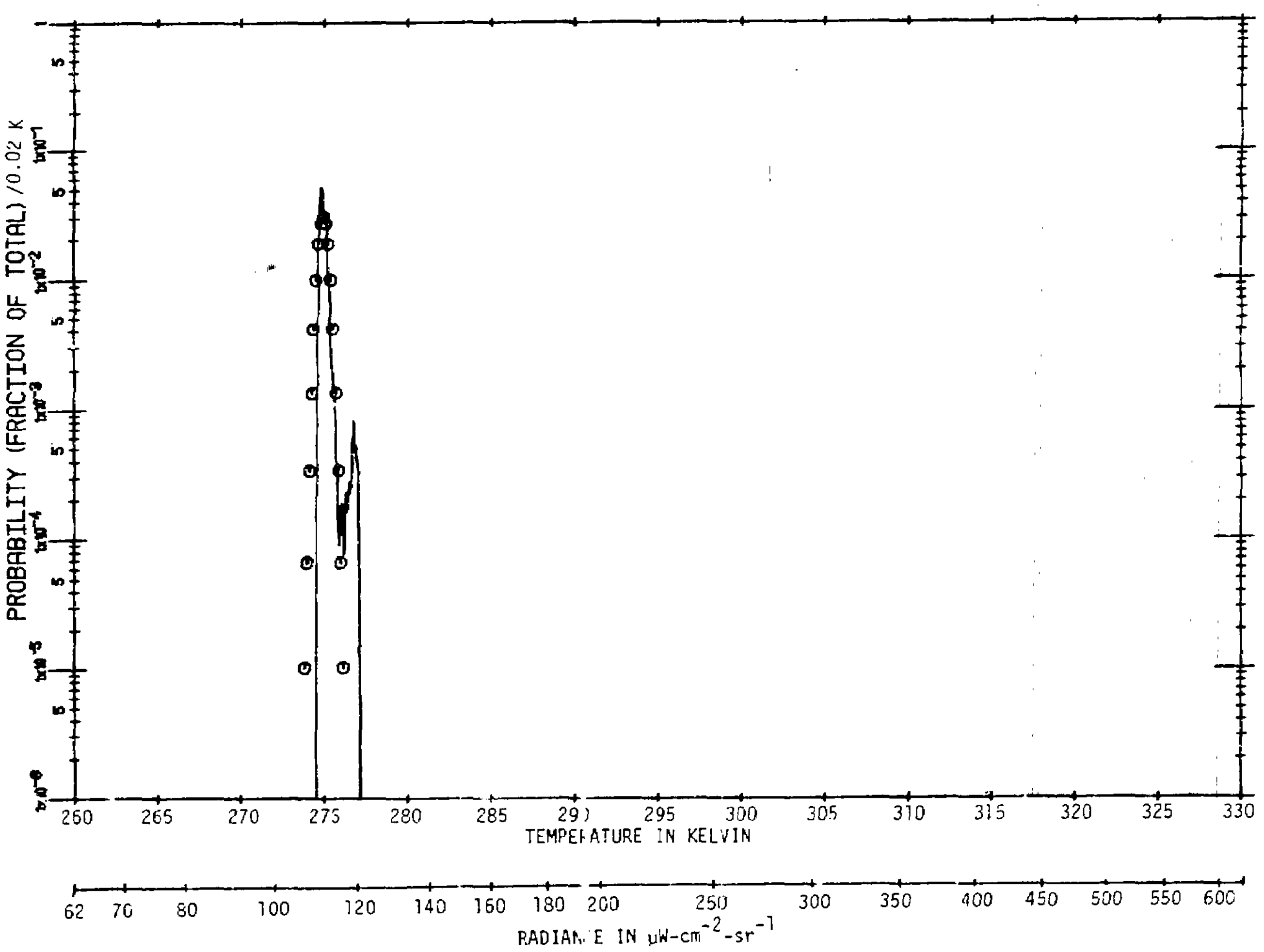
Area: FARMLAND Wavelength = 4.5 - 5.5 µm
Mean = 277.36
Std. Dev. = 1.05

NOON (ANGLE: 35 DEG.)



Area: FARMLAND Wavelength = 9.0 - 11.4 μm
Mean = 277.91
Std. Dev. = 1.49

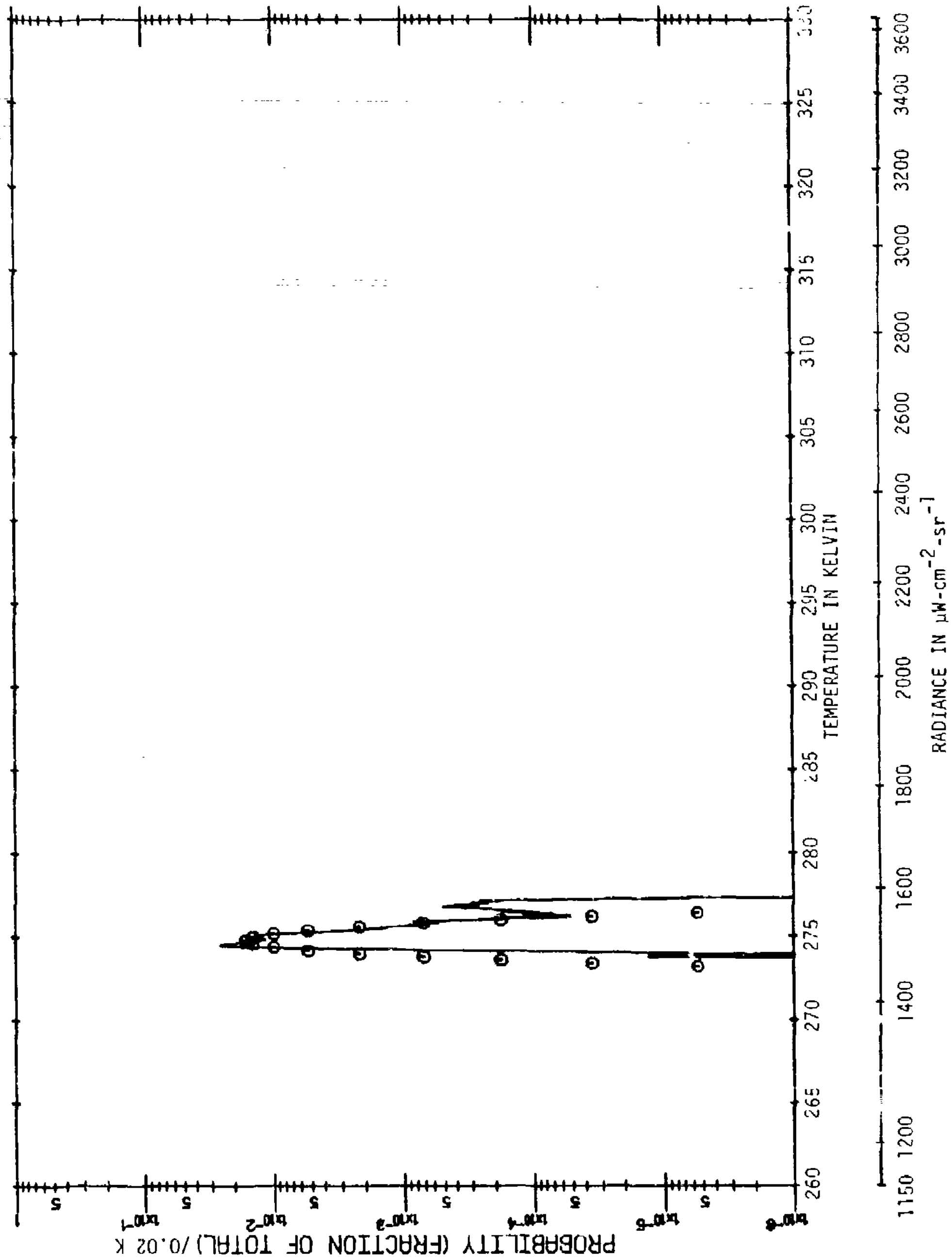
NOON (ANGLE: 35 DEG.)



Area: FARMLAND Wavelength = 4.5 - 5.5 um
Mean = 275.01
Std. Dev. = 0.29

SUNSET (ANGLE: 90 DEG.)

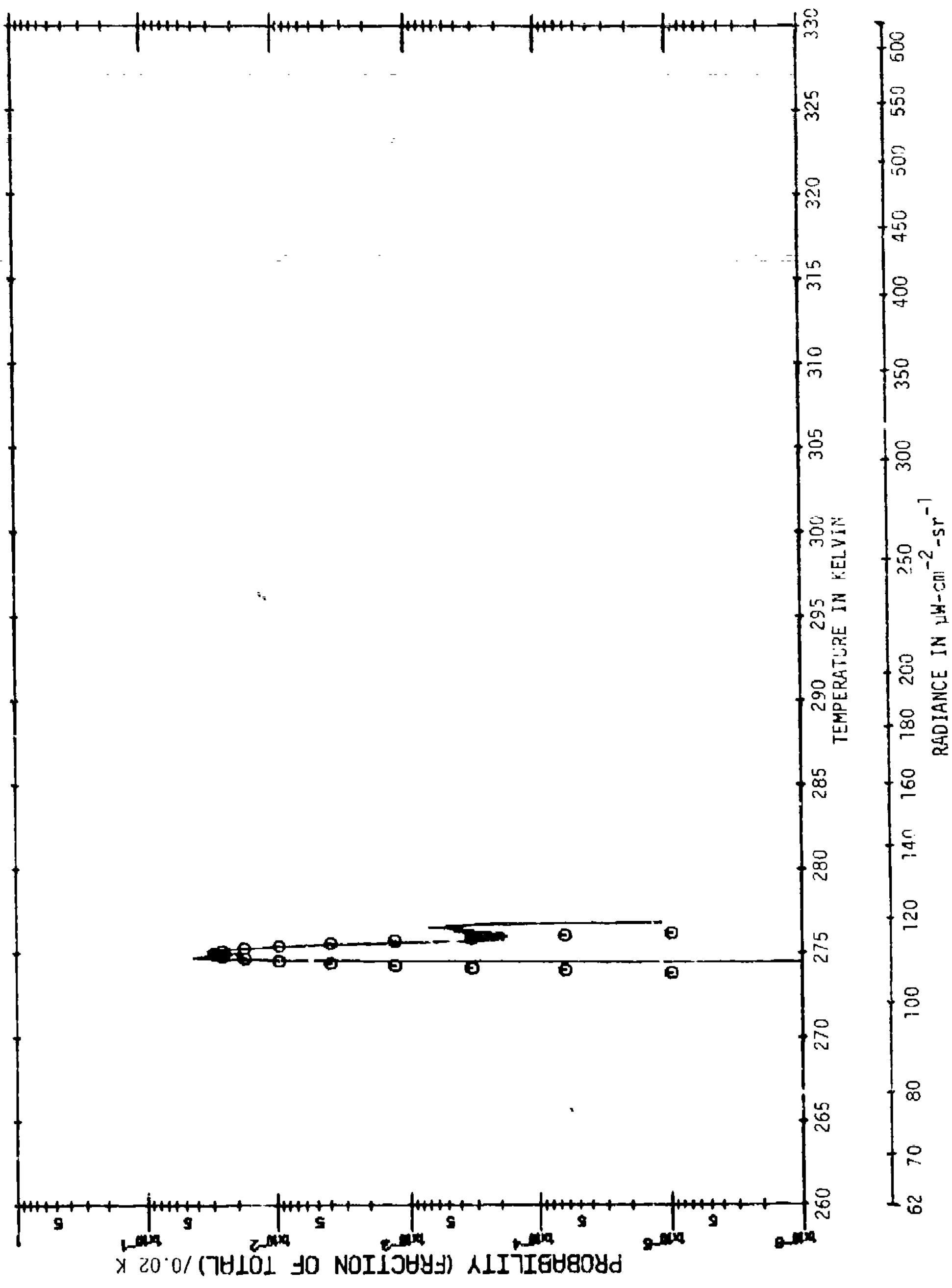
ERIM



Area: FARMLAND Wavelength = 9.0 - 11.4 μm
Mean = 274.79
Std. Dev. = 0.40

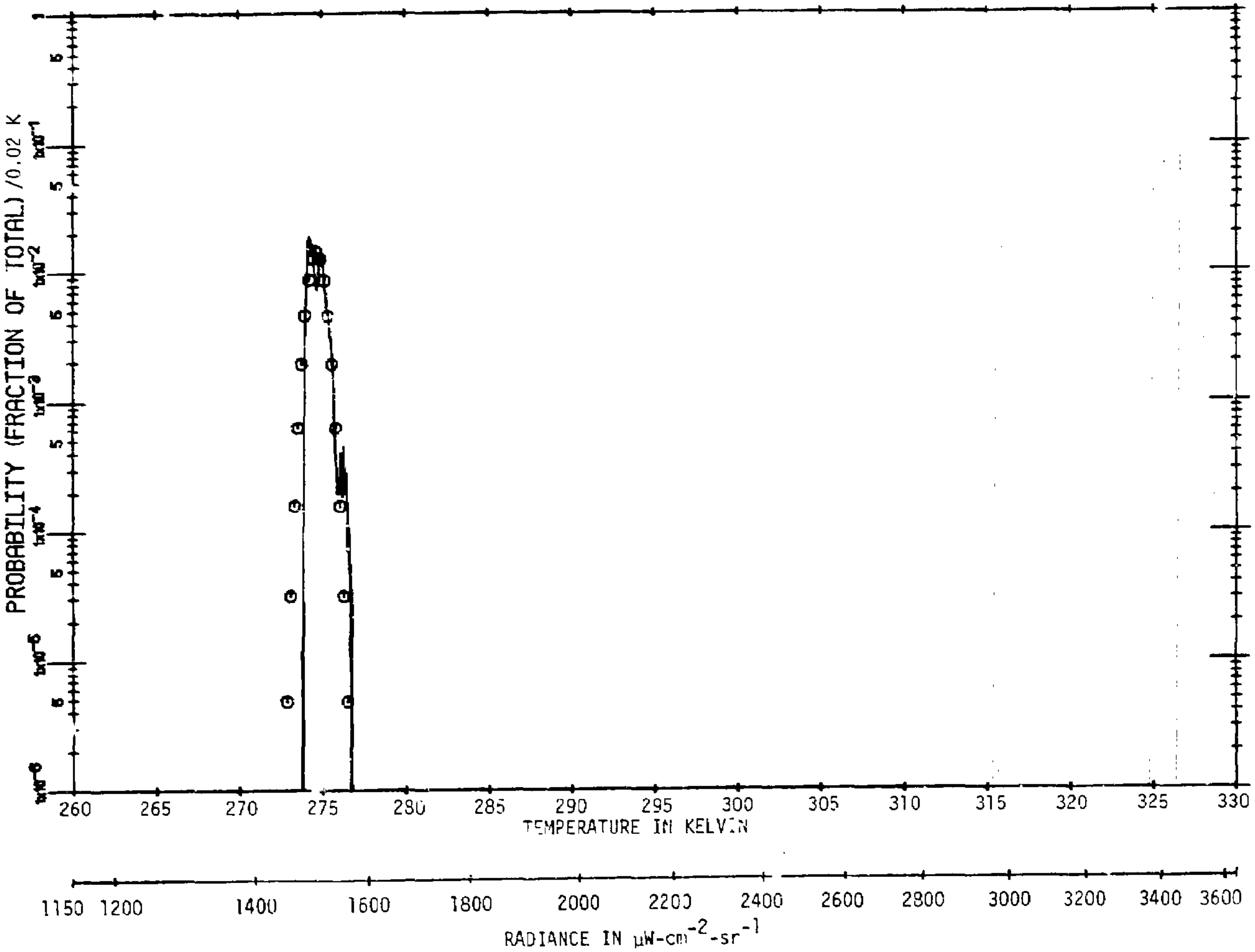
SUNSET (ANGLE: 90 DEG.)

ERIM



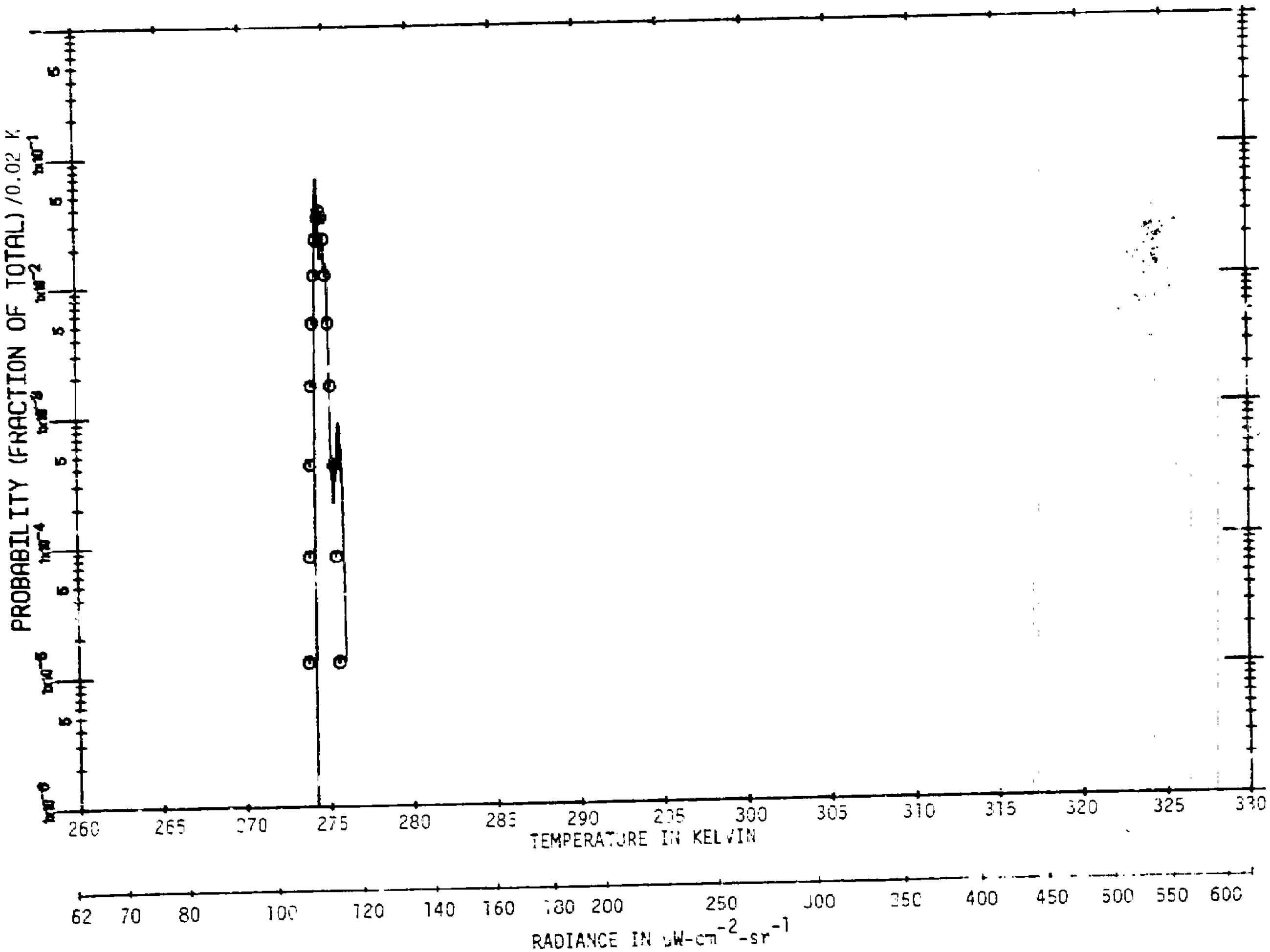
Area: FARMLAND Wavelength = 4.5 - 5.5 µm
Mean = 275.02
Std. Dev. = 0.30

SUNSET (ANGLE: 35 DEG.)



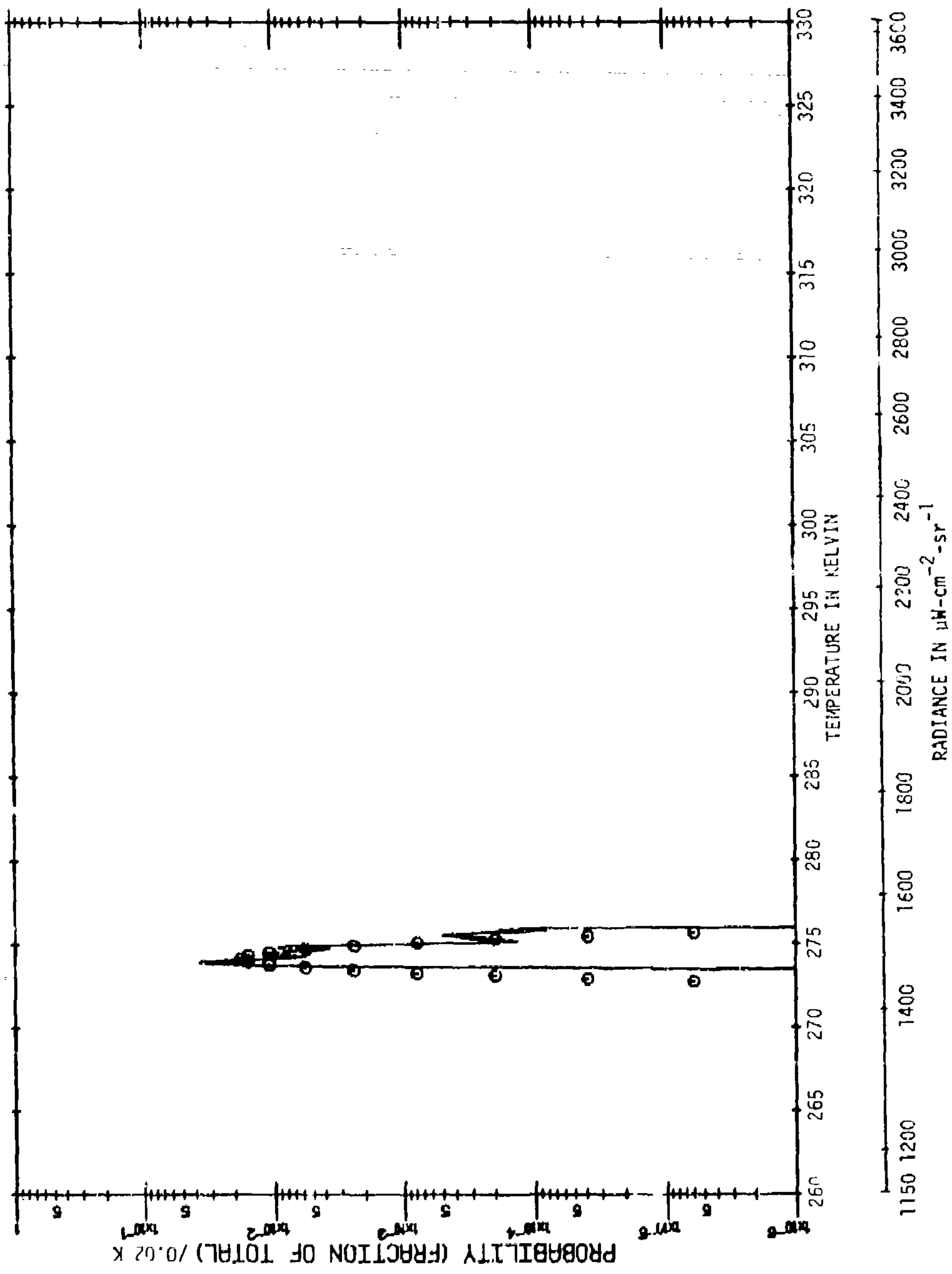
Area: FARMLAND Wavelength = 9.0 - 11.4 um
Mean = 274.70
Std. Dev. = 0.46

SUNSET (ANGLE: 35 DEG.)



Area: FARMLAND Wavelength = 4.5 - 5.5 μm
Mean - 274.66
Std. Dev. = 0.23

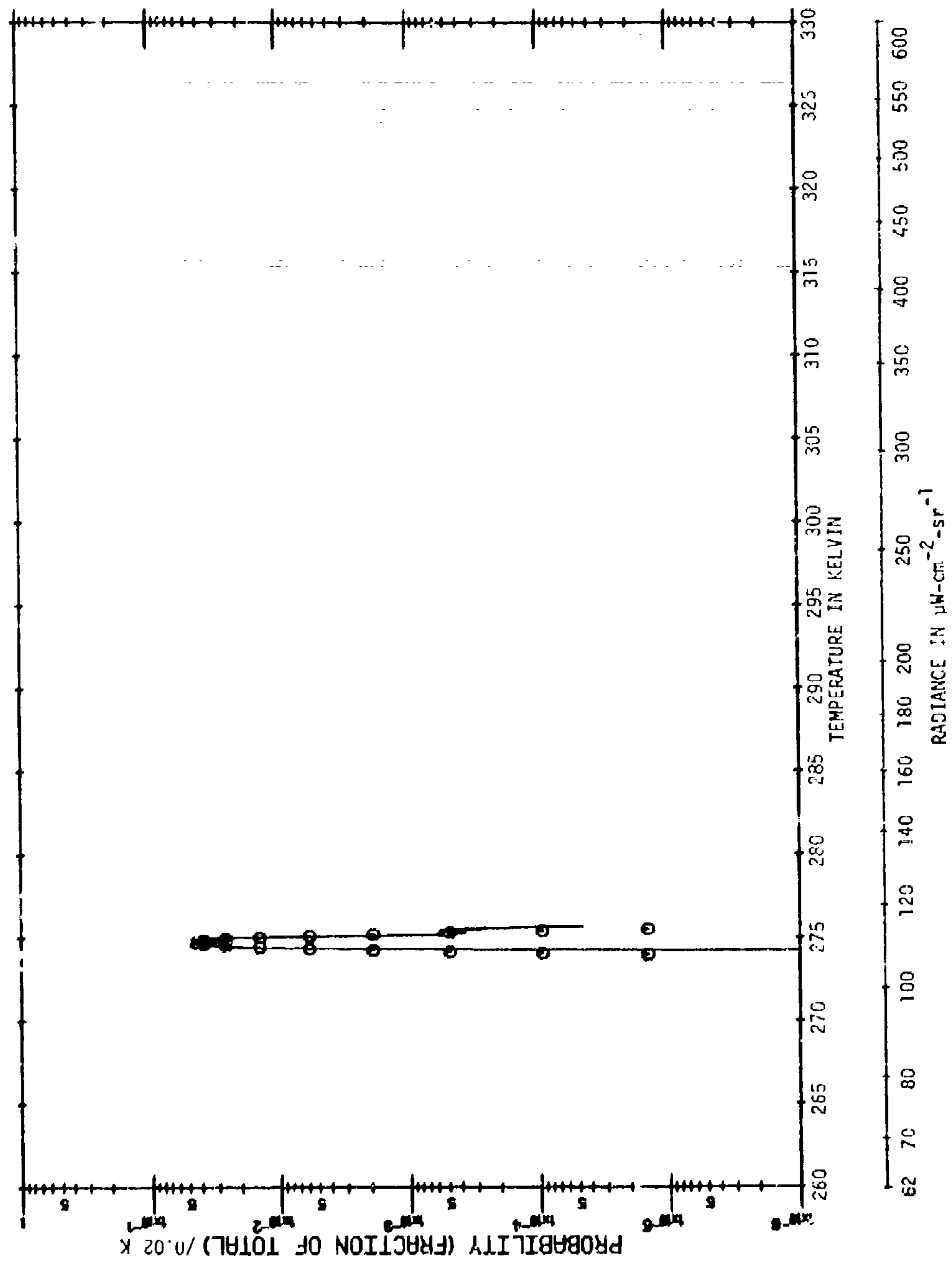
MIDNIGHT (ANGLE: 90 DEG.)



Area: FARMLAND Wavelength = 9.0 - 11.4 μm
Mean = 274.16
Std. Dev. = 0.36

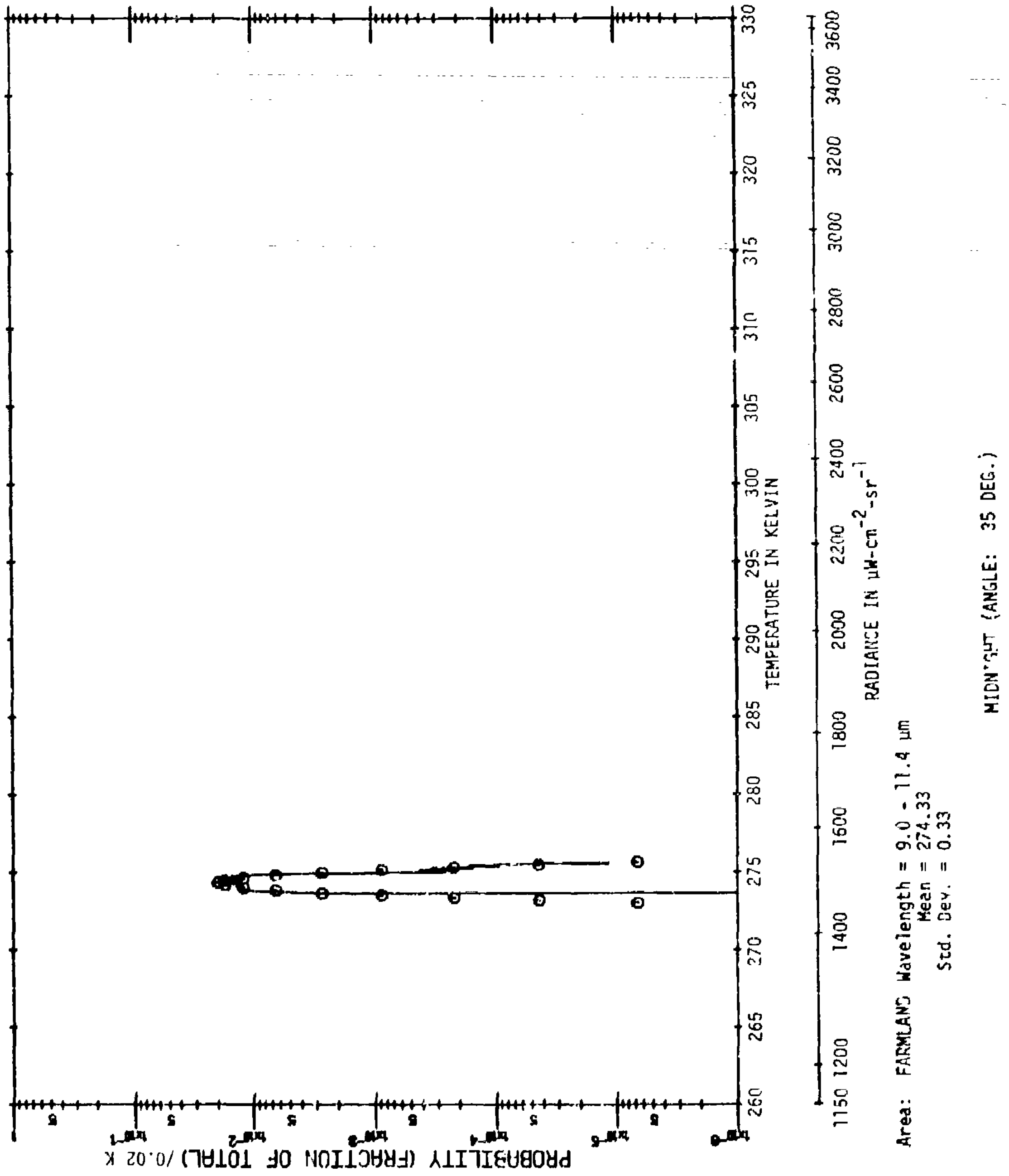
MIDNIGHT (ANGLE: 90 DEG.)

ERIM



Area: FARMLAND Wavelength = 4.5 - 5.5 µm
Mean = 274.75
S.D. Dev. = 0.19

MIDNIGHT (ANGLE: 35 DEG.)

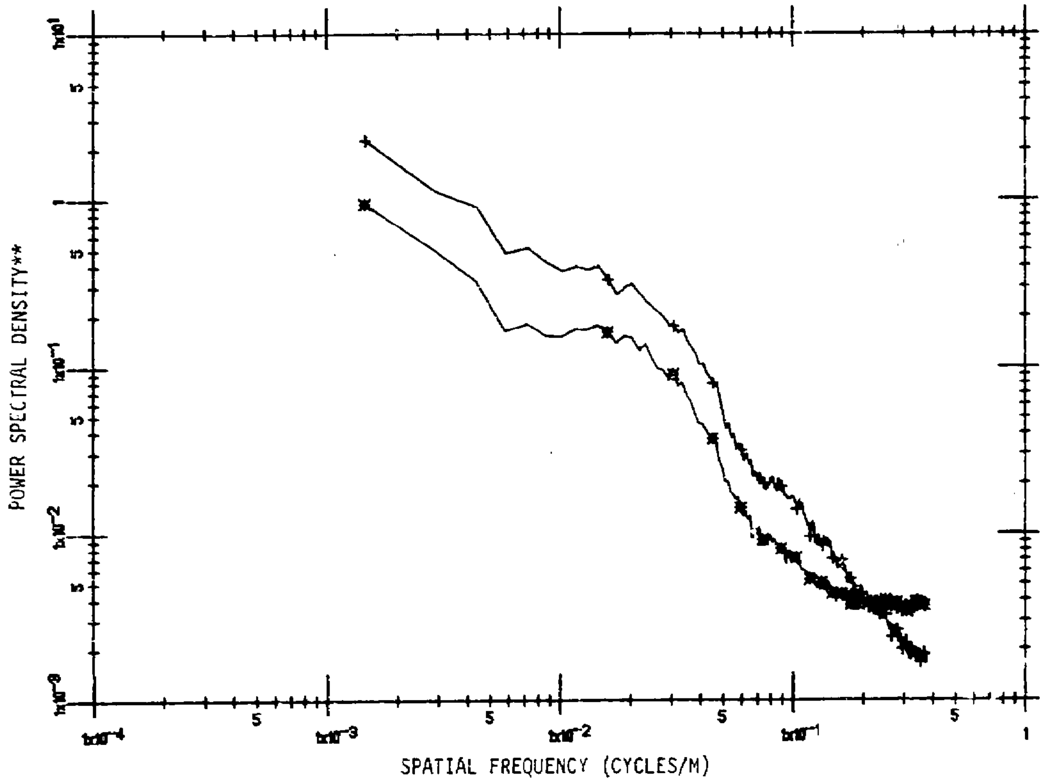

PROBABILITY (FRACTION OF TOTAL)/0.02 K
TEMPERATURE IN KELVIN
RADIANCE IN µW-cm⁻²-sr⁻¹
Area: FARMLAND Wavelength = 9.0 - 11.4 µm
Mean = 274.33
Std. Dev. = 0.33
MIDNIGHT (ANGLE: 35 DEG.)

ERIM

MICHIGAN WINTER SCENE - FARMLAND

Power Spectra

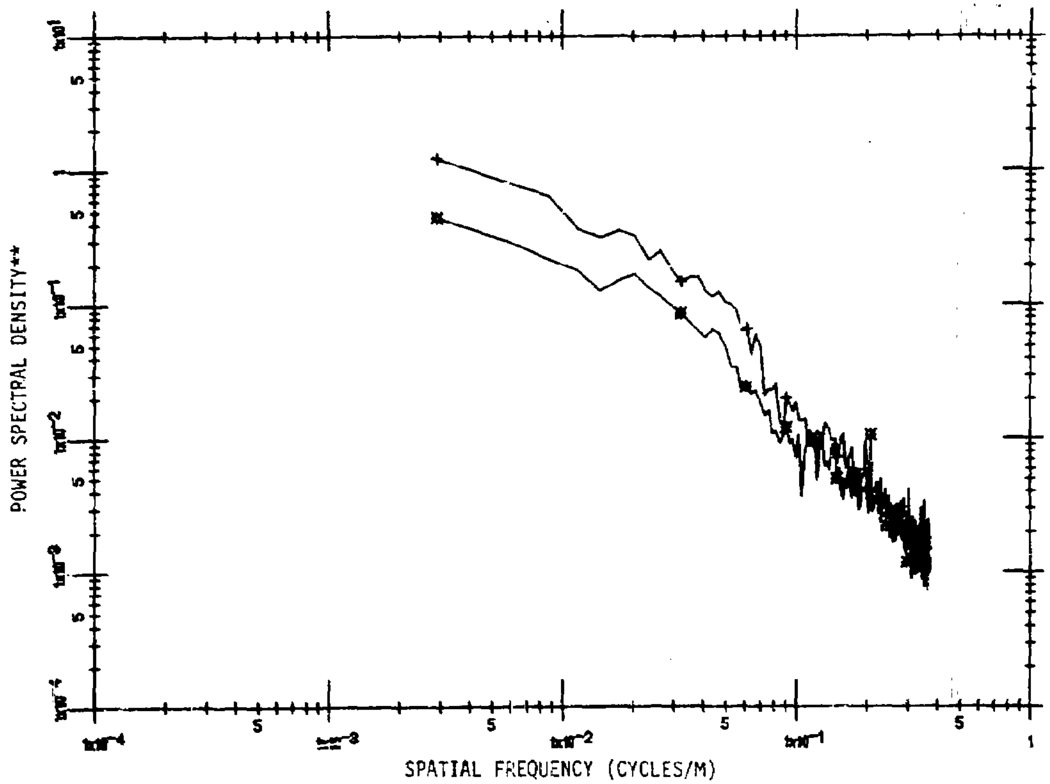
Spectral Bands: 3.5 - 3.9 µm
4.5 - 5.5 µm
9.0 - 11.4 µm



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - CROSS-TRACK

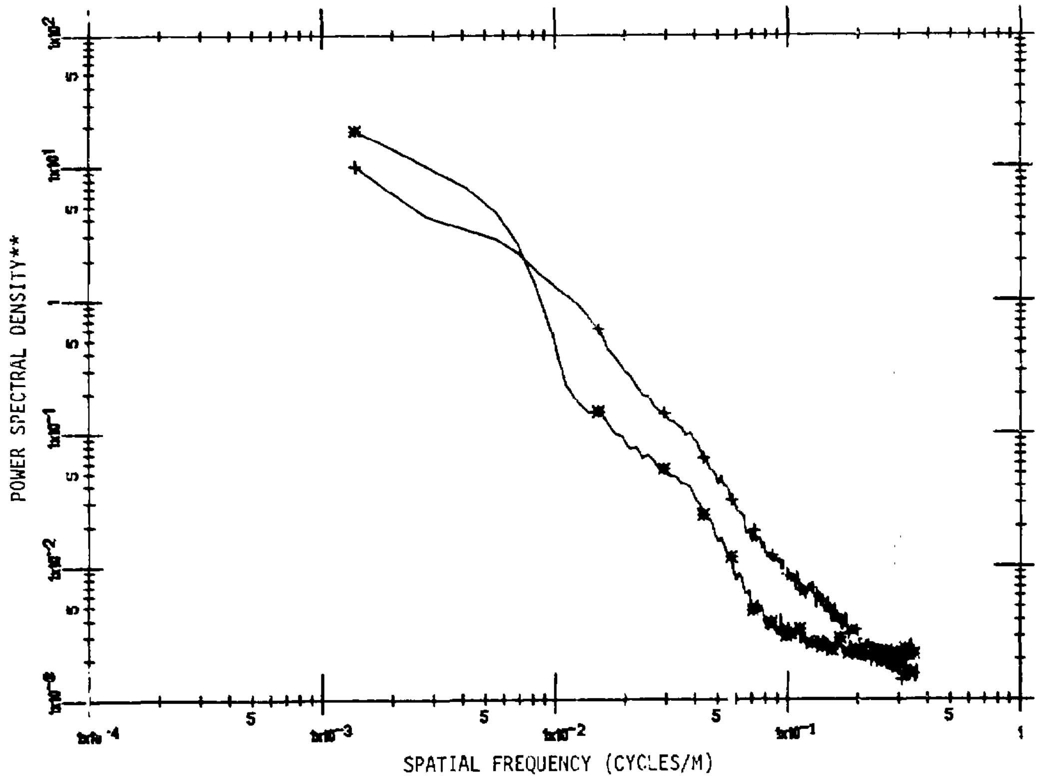
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - IN-TRACK

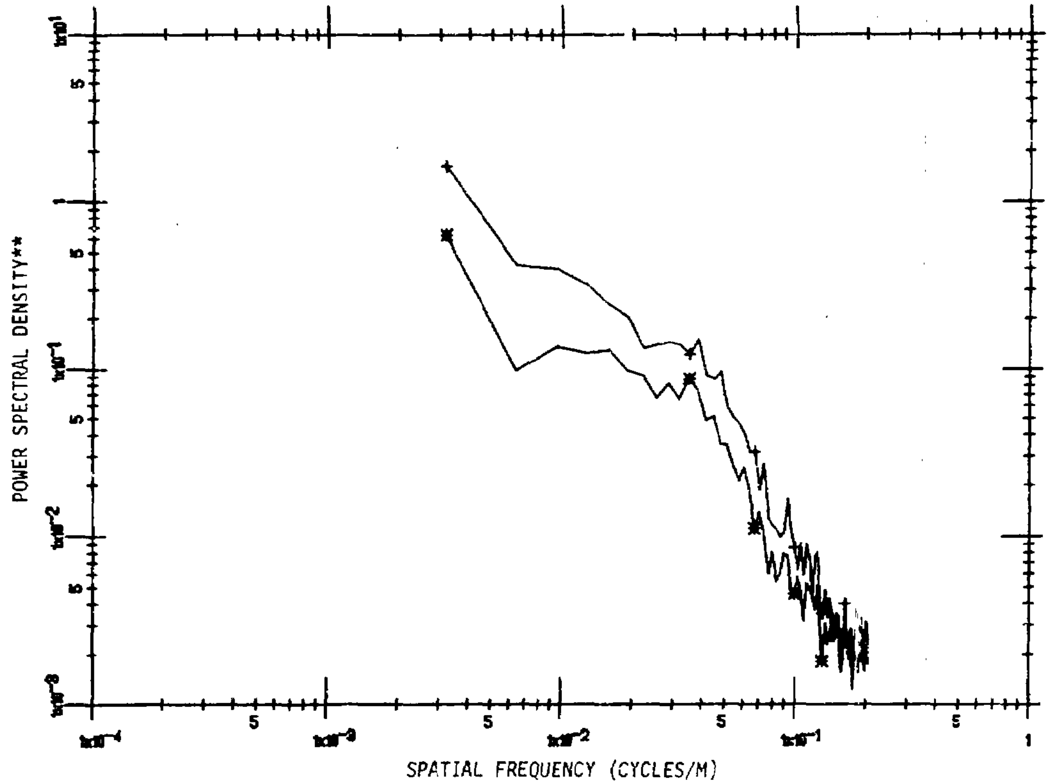
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - CROSS-TRACK

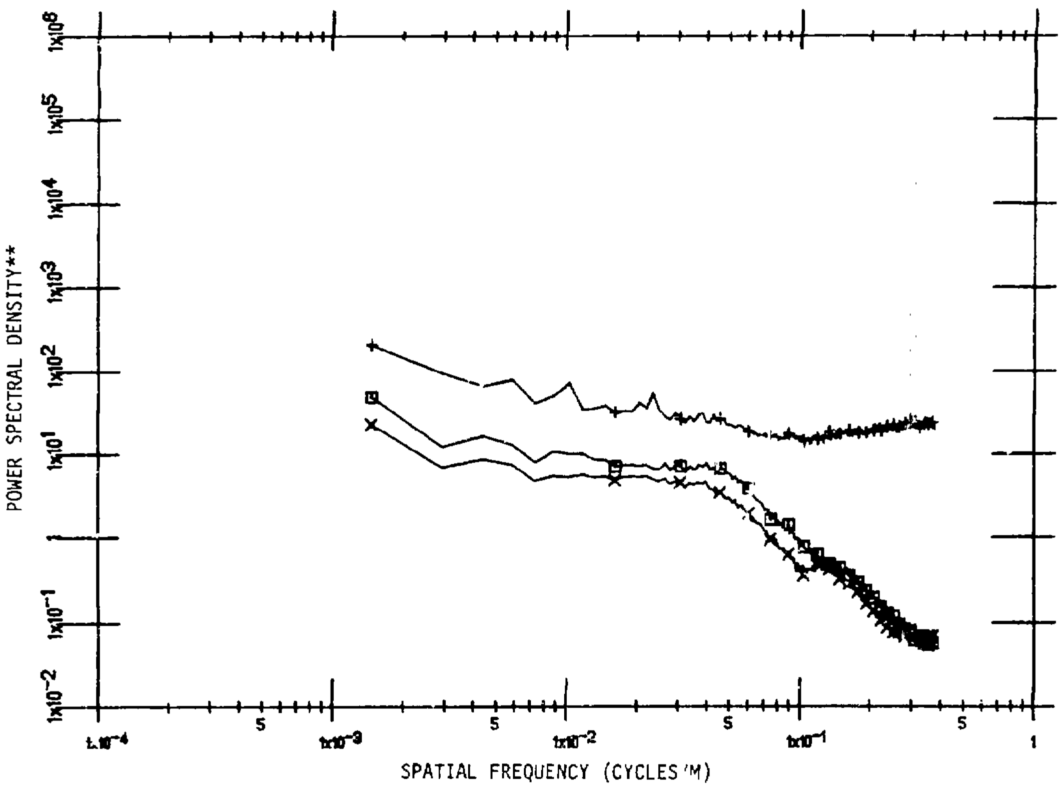
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 µm and 9.0 to 11.4 µm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - IN-TRACK

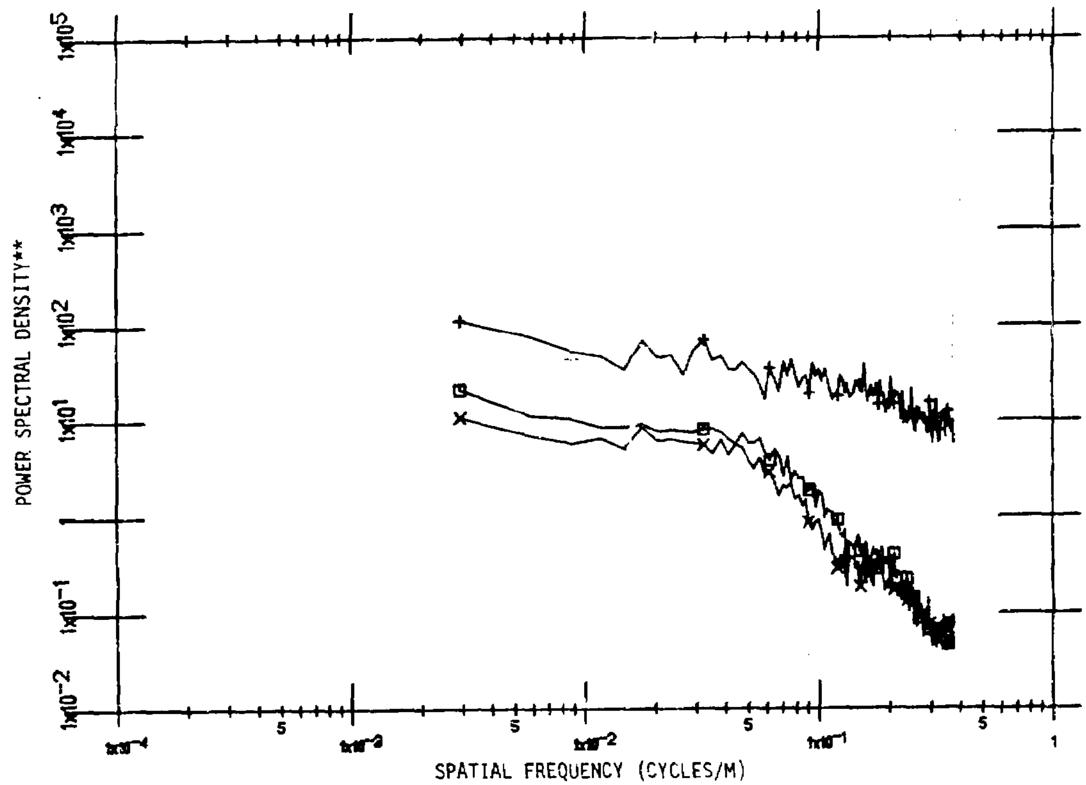
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.5 μm bands.



Area: FARMLAND Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - CROSS-TRACK

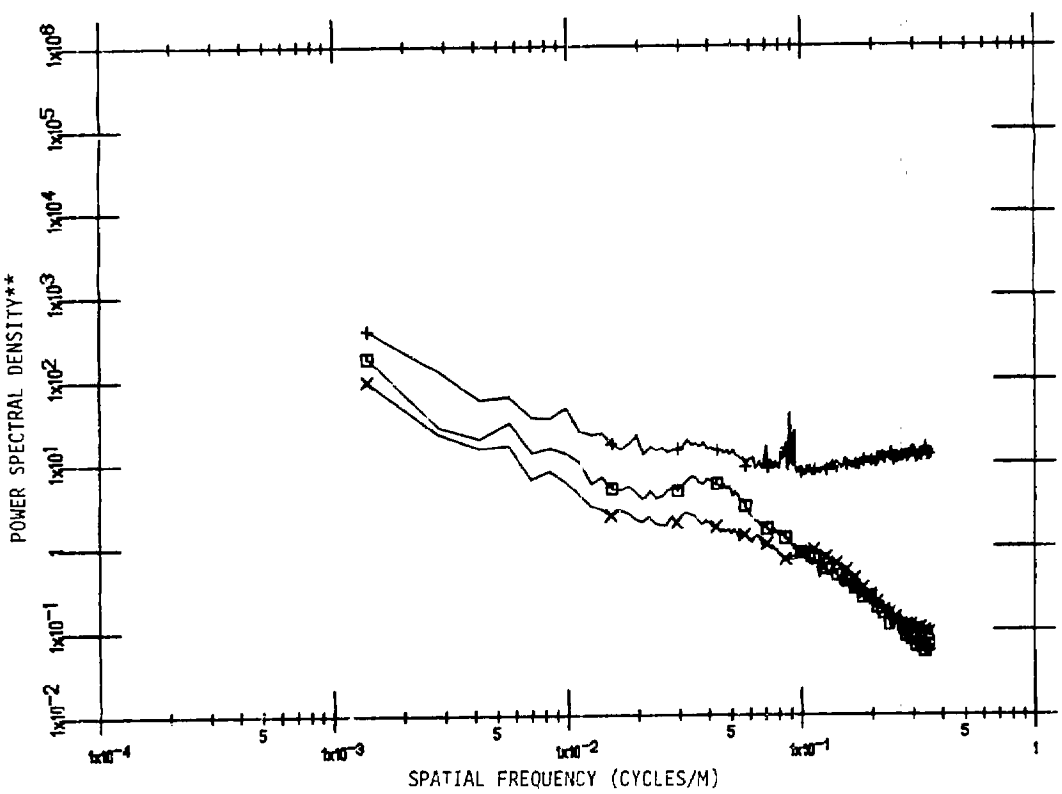
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - IN-TRACK

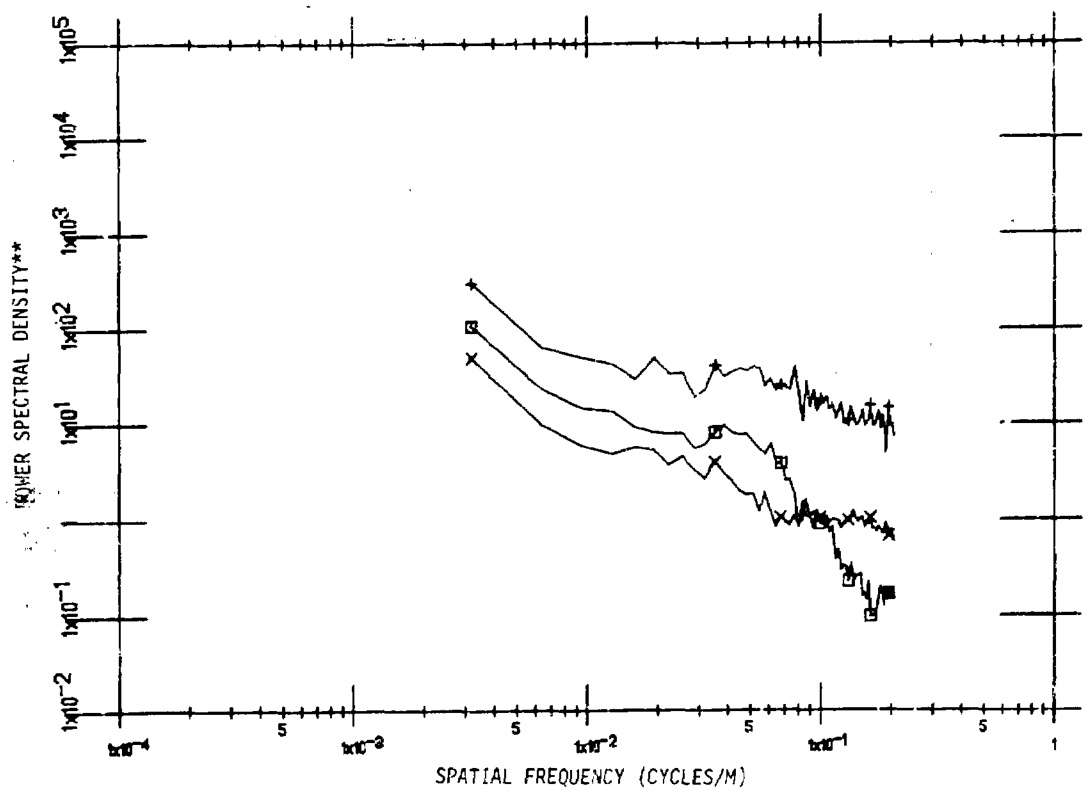
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - CROSS-TRACK

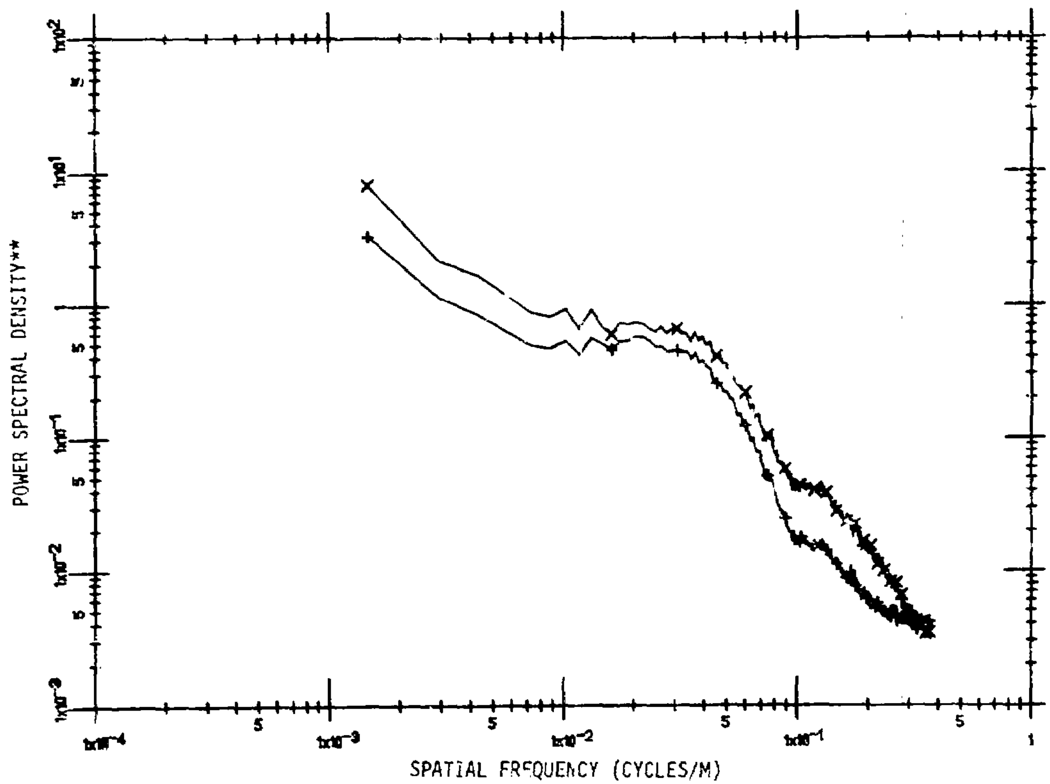
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - IN-TRACK

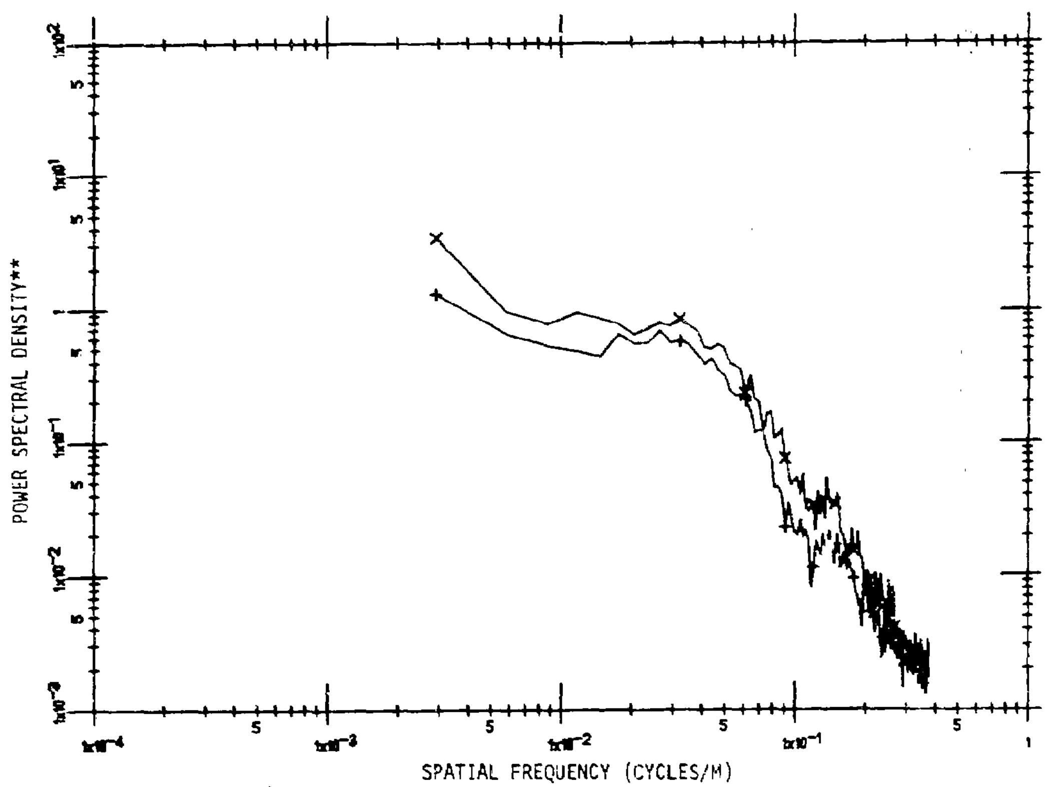
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - CROSS-TRACK

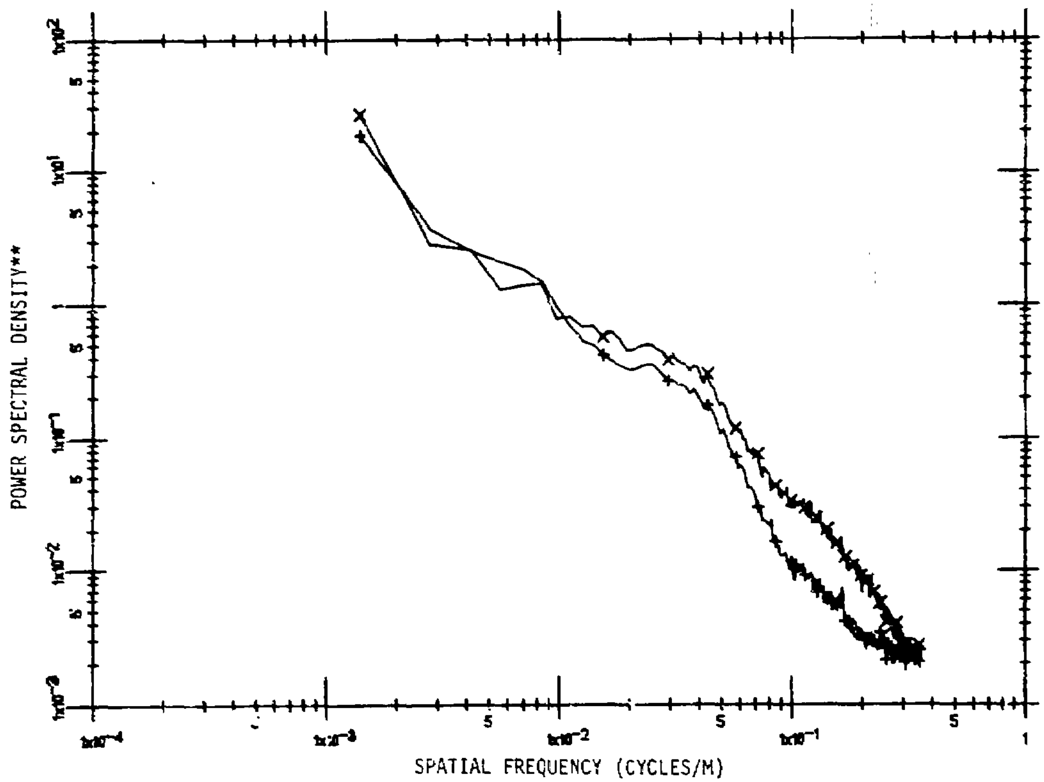
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - IN-TRACK

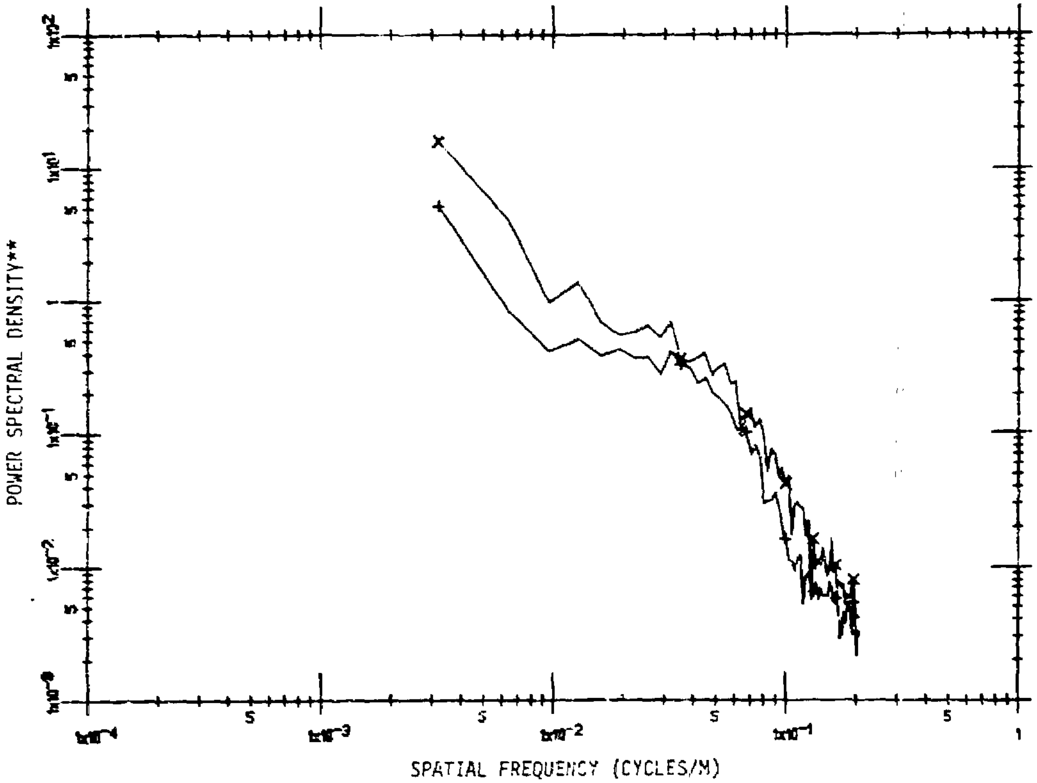
** Power Spectral Density is (°K)^2/cycle/meter for 4.5 to 5 ~~d 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - CROSS-TRACK

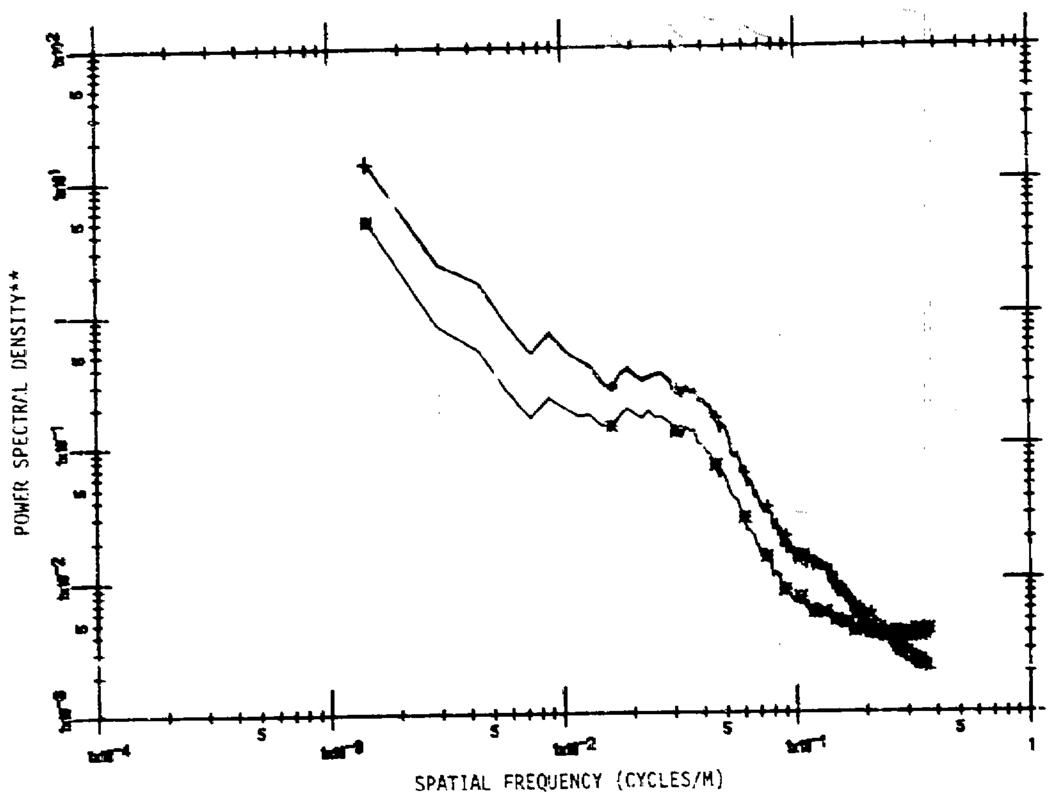
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - IN-TRACK

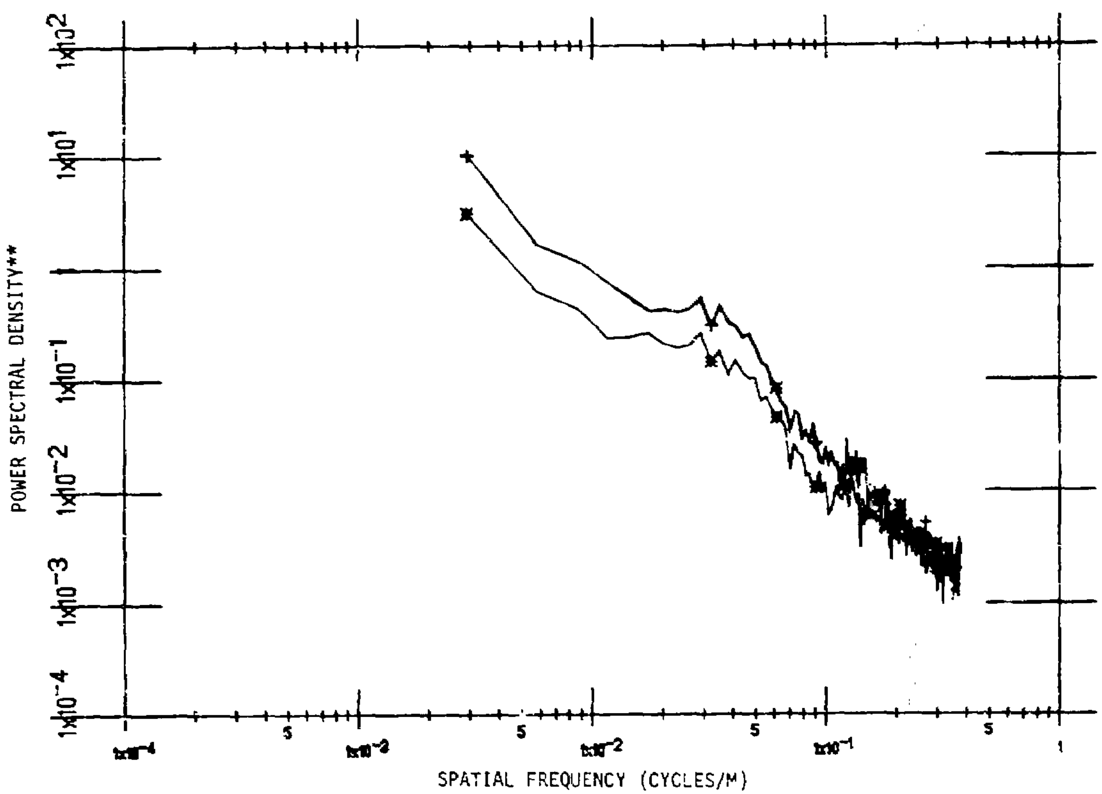
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - CROSS-TRACK

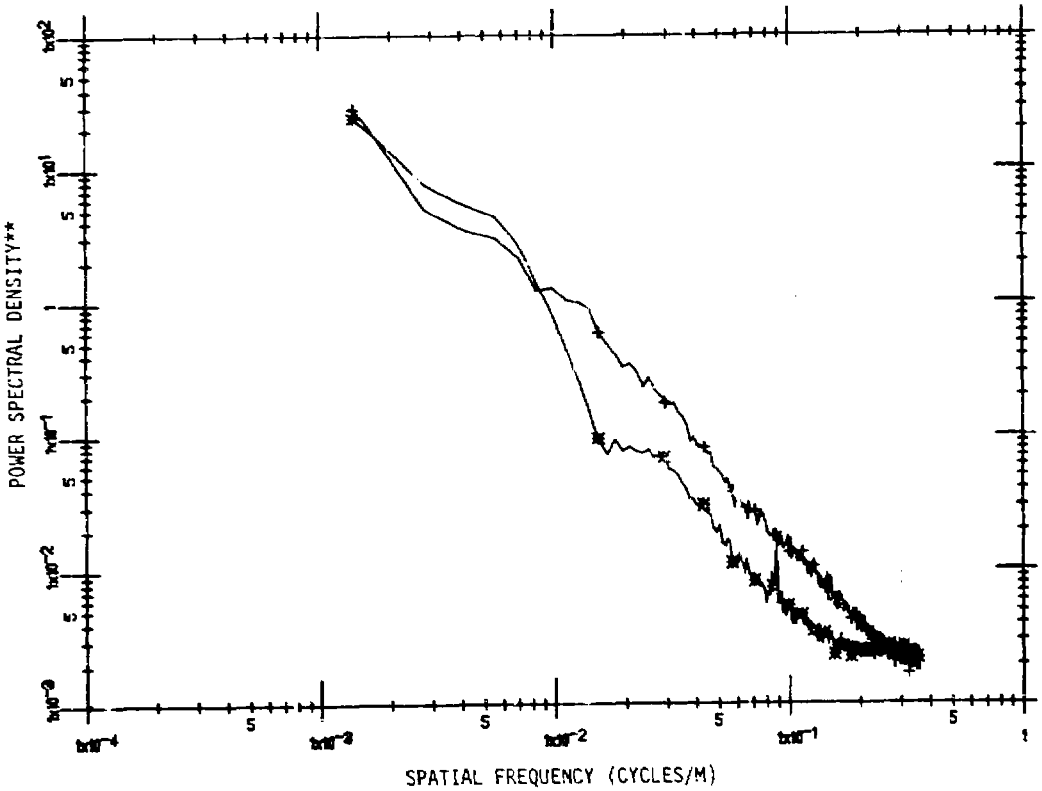
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - IN-TRACK

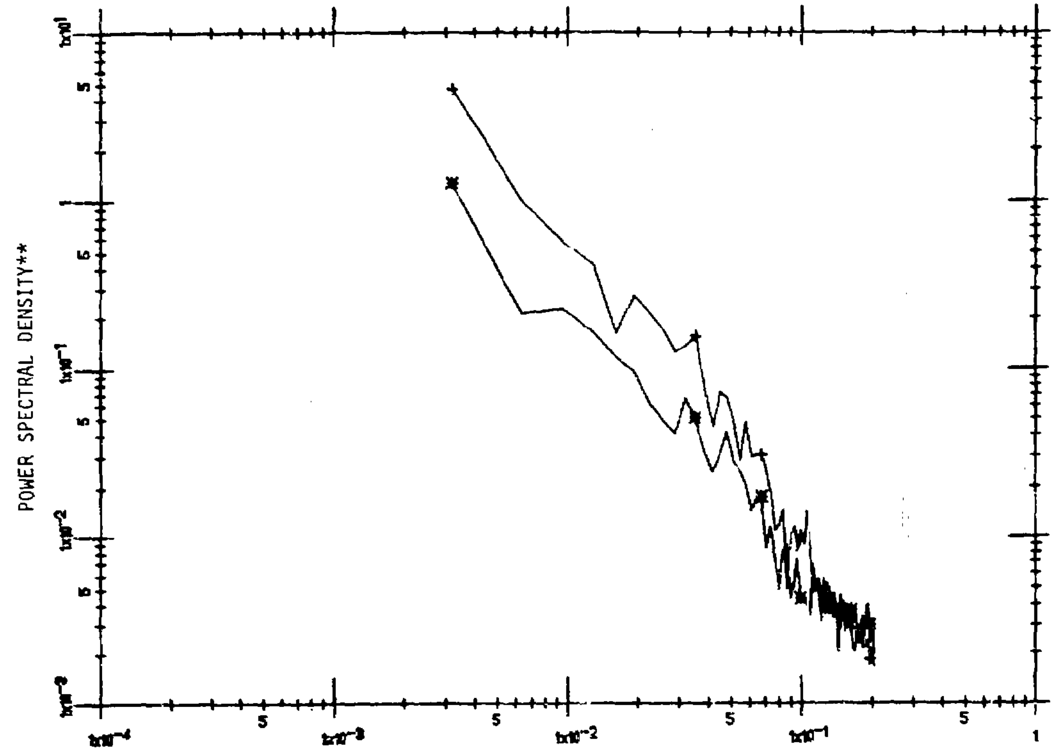
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - CROSS-TRACK

** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: FARMLAND Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - IN-TRACK

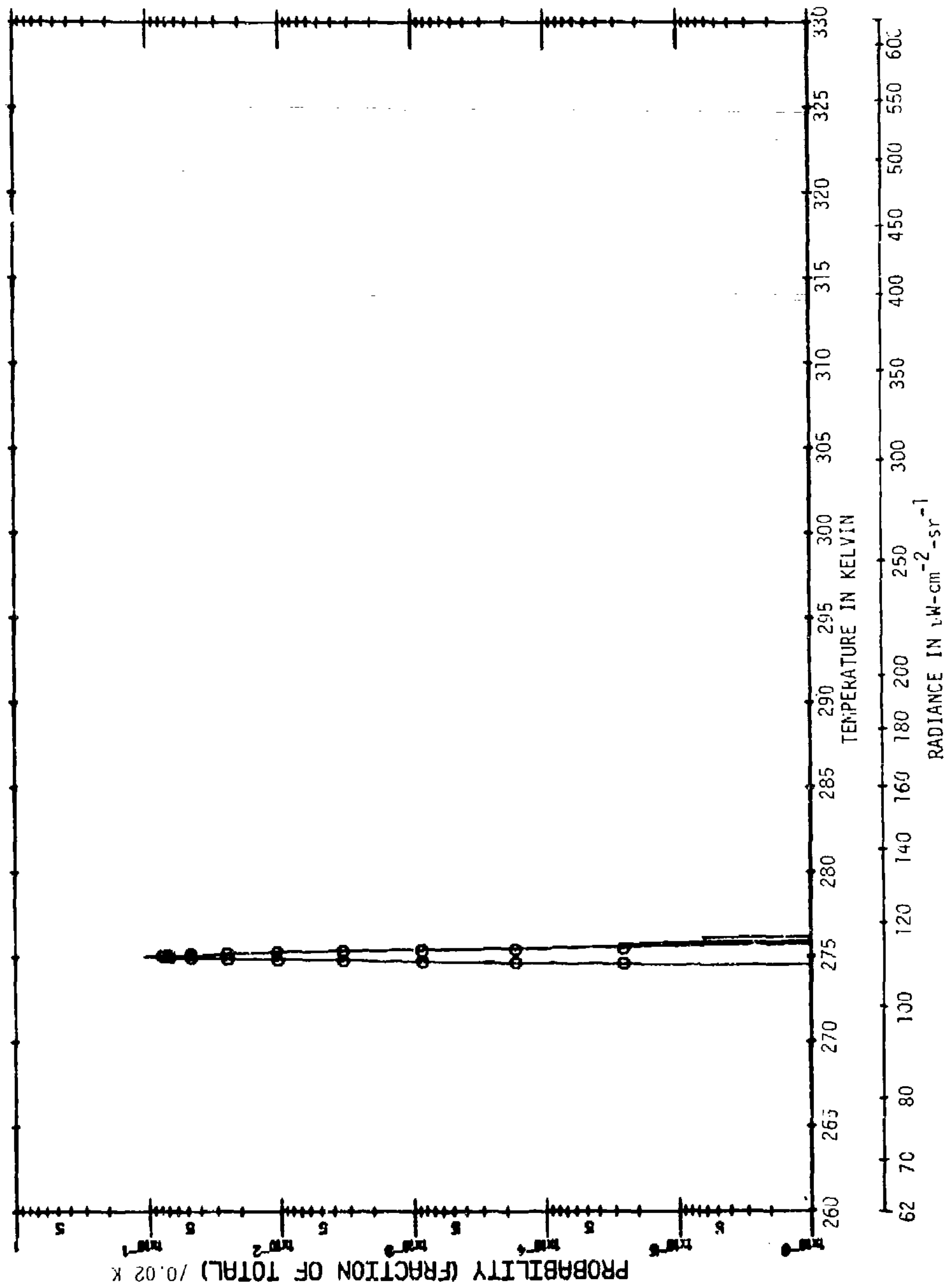
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.

MICHIGAN WINTER SCENE - LAND & WATER

Histograms*

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

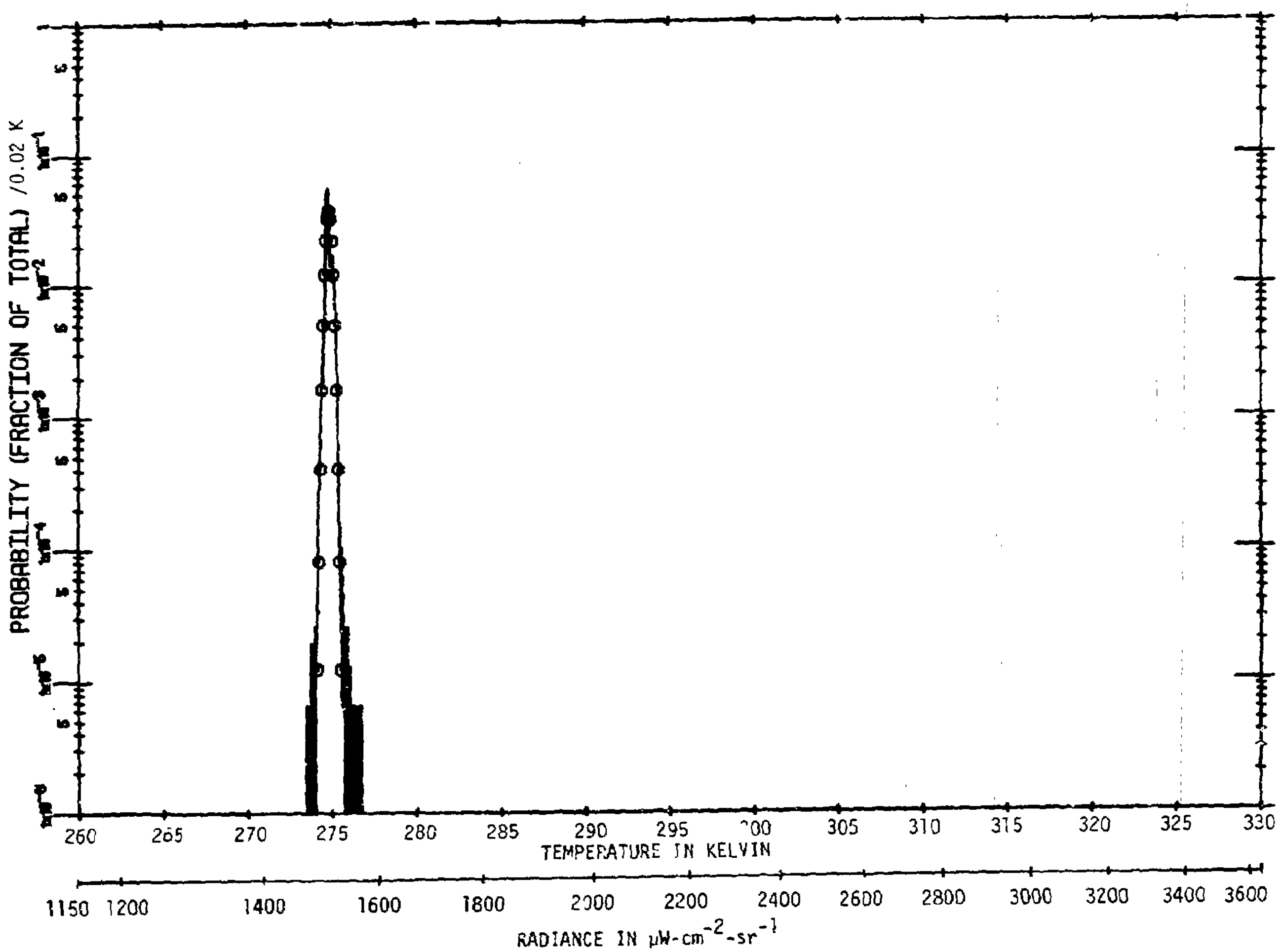
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



Area: LAND & WATER Wavelength = 4.5 - 5.5 µm
Mean = 275.05
Std. Dev. = 0.11

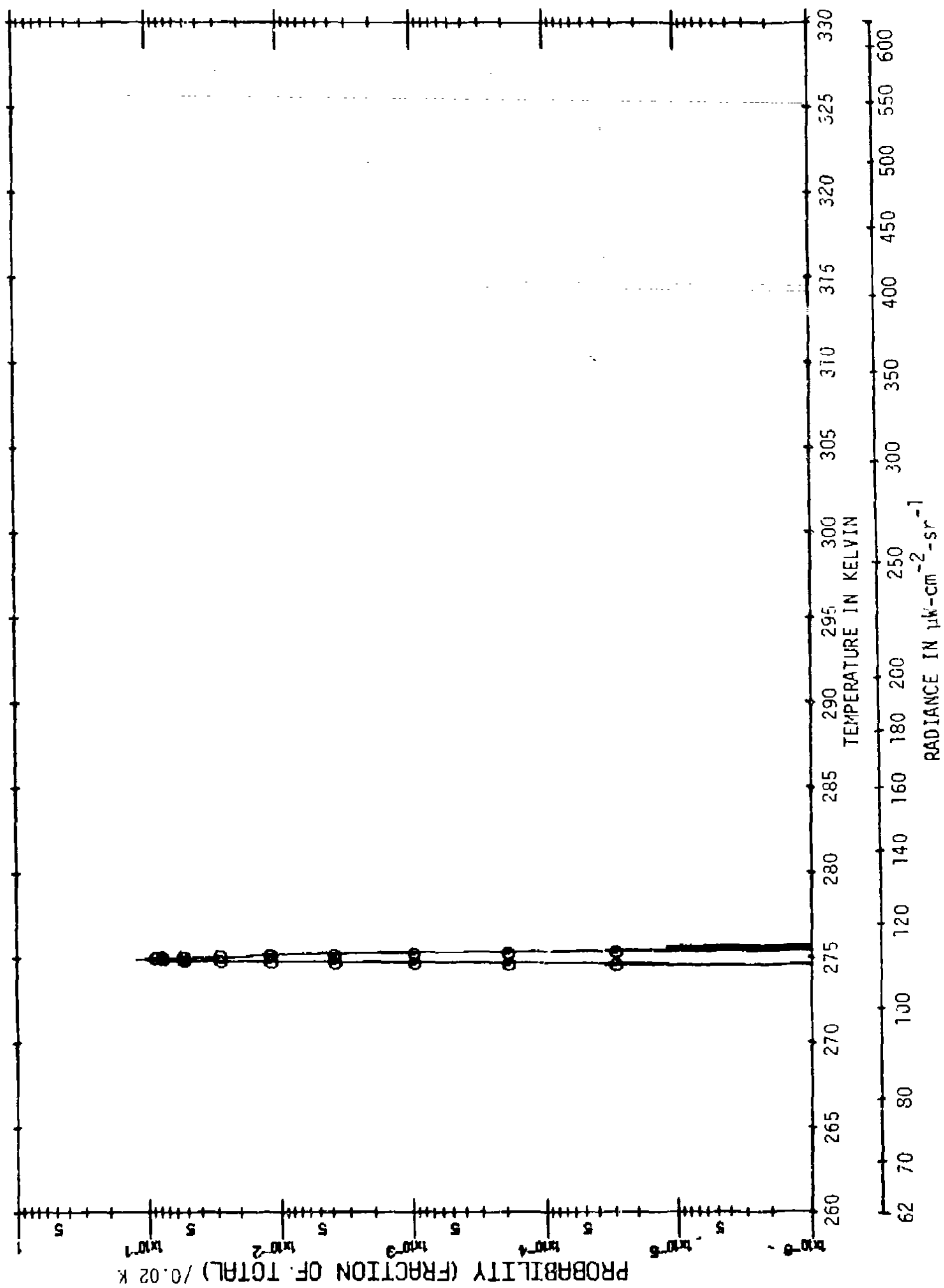
PRE-DAWN (ANGLE: 90 DEG.)

ERIM



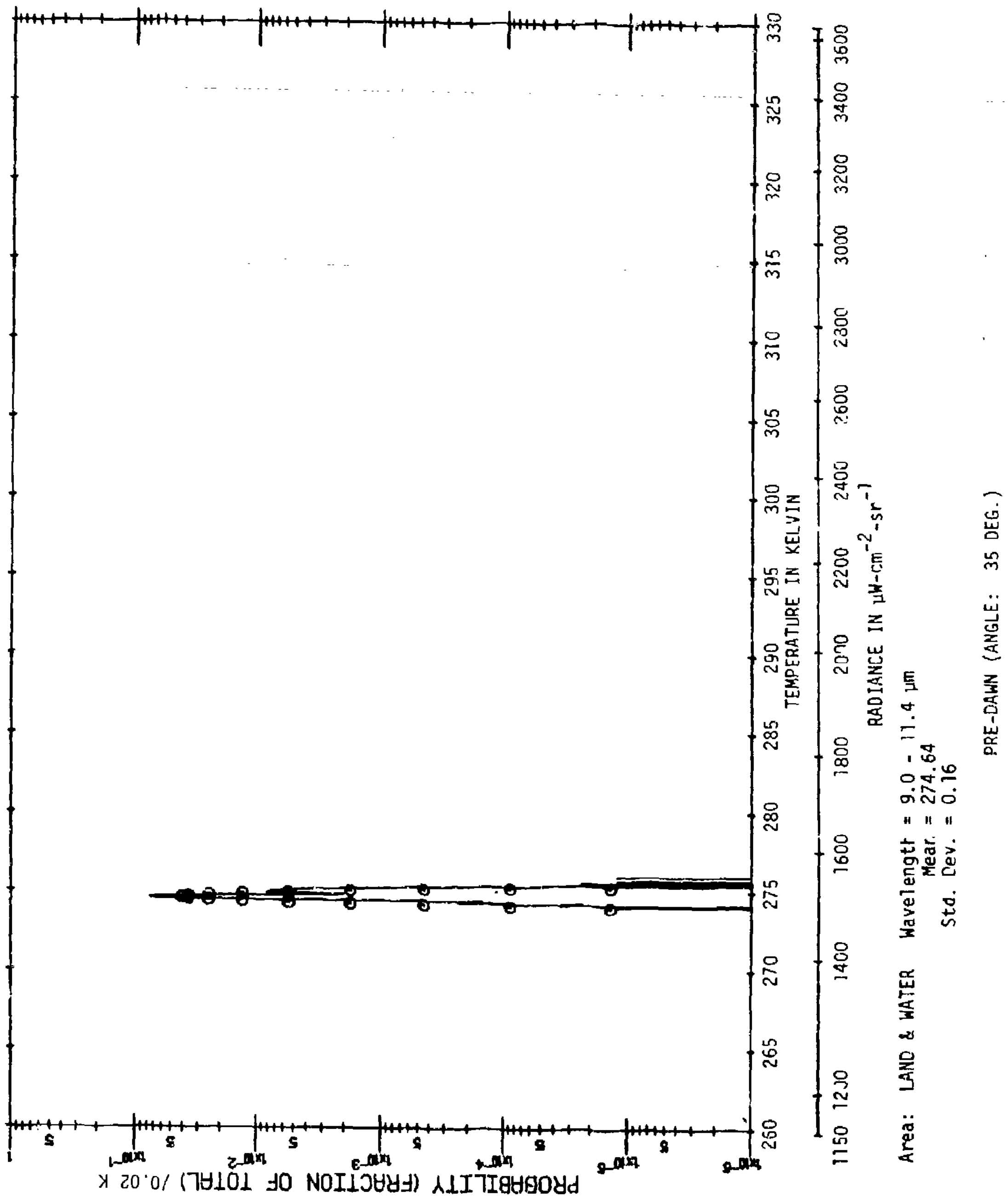
Area: LAND & WATER Wavelength = 9.0 - 11.4 μm
Mean = 274.87
Std. Dev. = 0.17

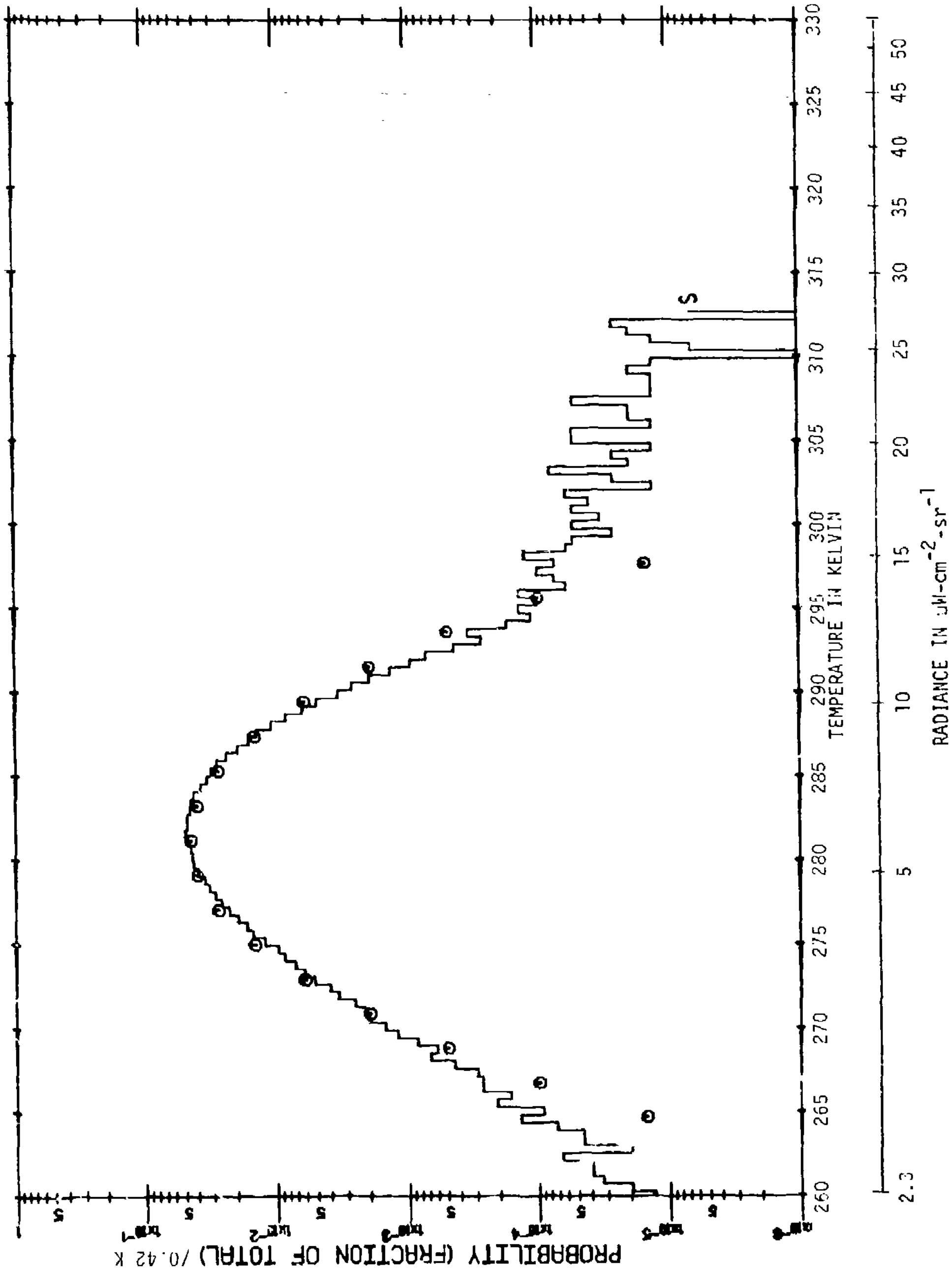
PRE-DAWN (ANGLE: 90 DEG.)



Area: LAND & WATER   Wavelength = 4.5 - 5.5 μm
Mean = 274.96
Std. Dev. = 0.10

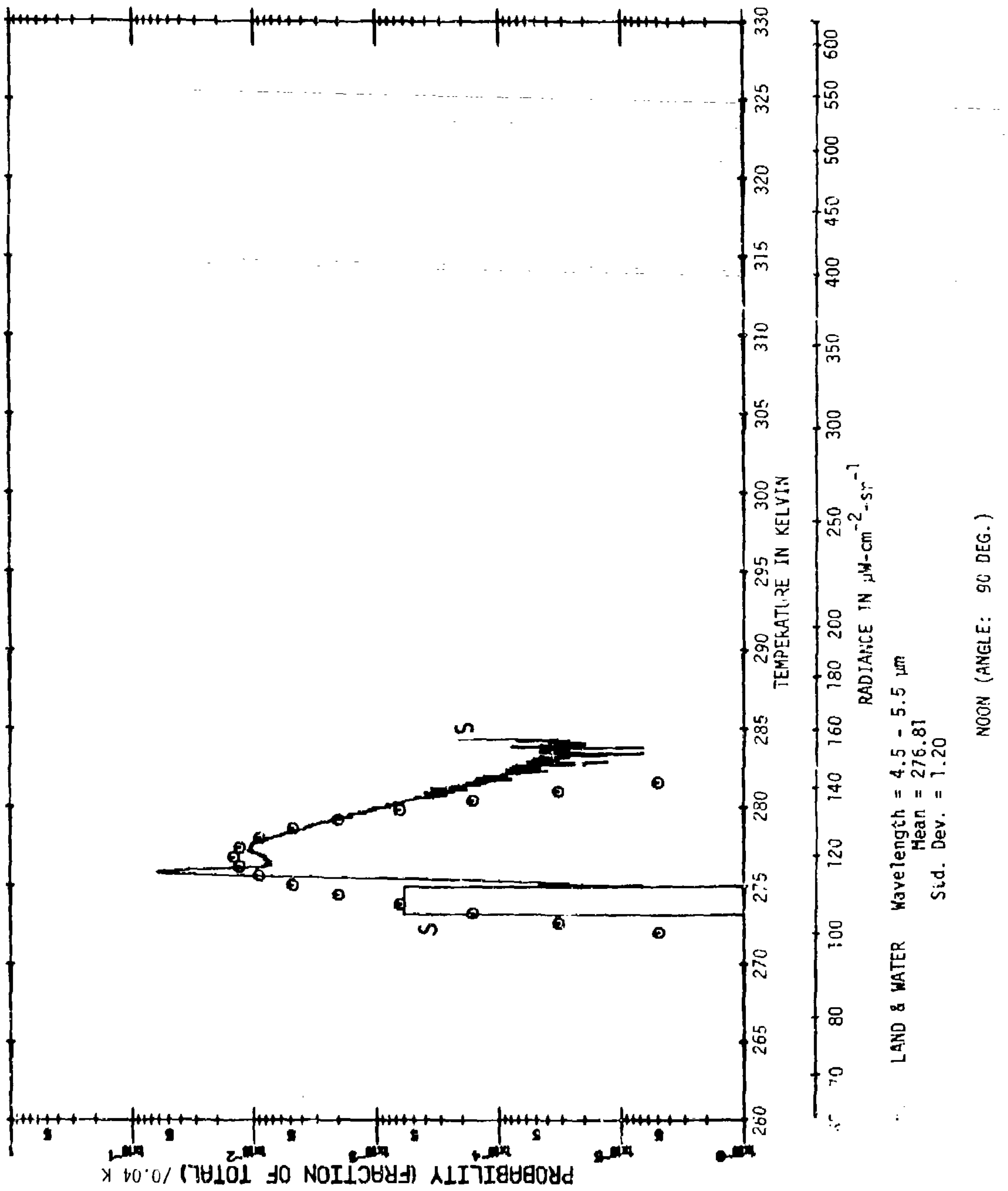
PRE-DAWN (ANGLE: 35 DEG.)


TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
1150 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600
PROBABILITY (FRACTION OF TOTAL) /0.02 K
Area: LAND & WATER
Wavelength = 9.0 - 11.4 µm
Mean = 274.64
Std. Dev. = 0.16
PRE-DAWN (ANGLE: 35 DEG.)

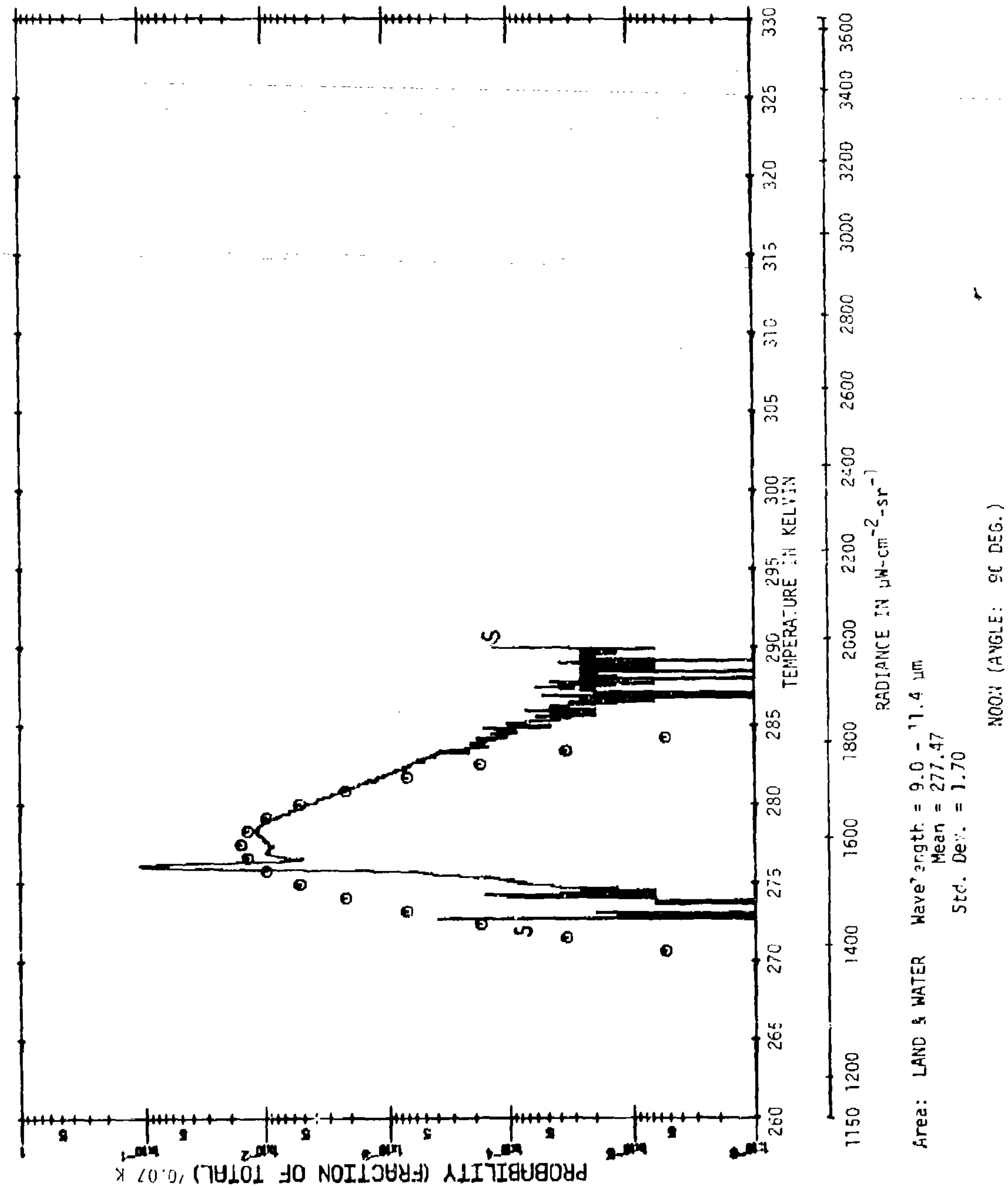


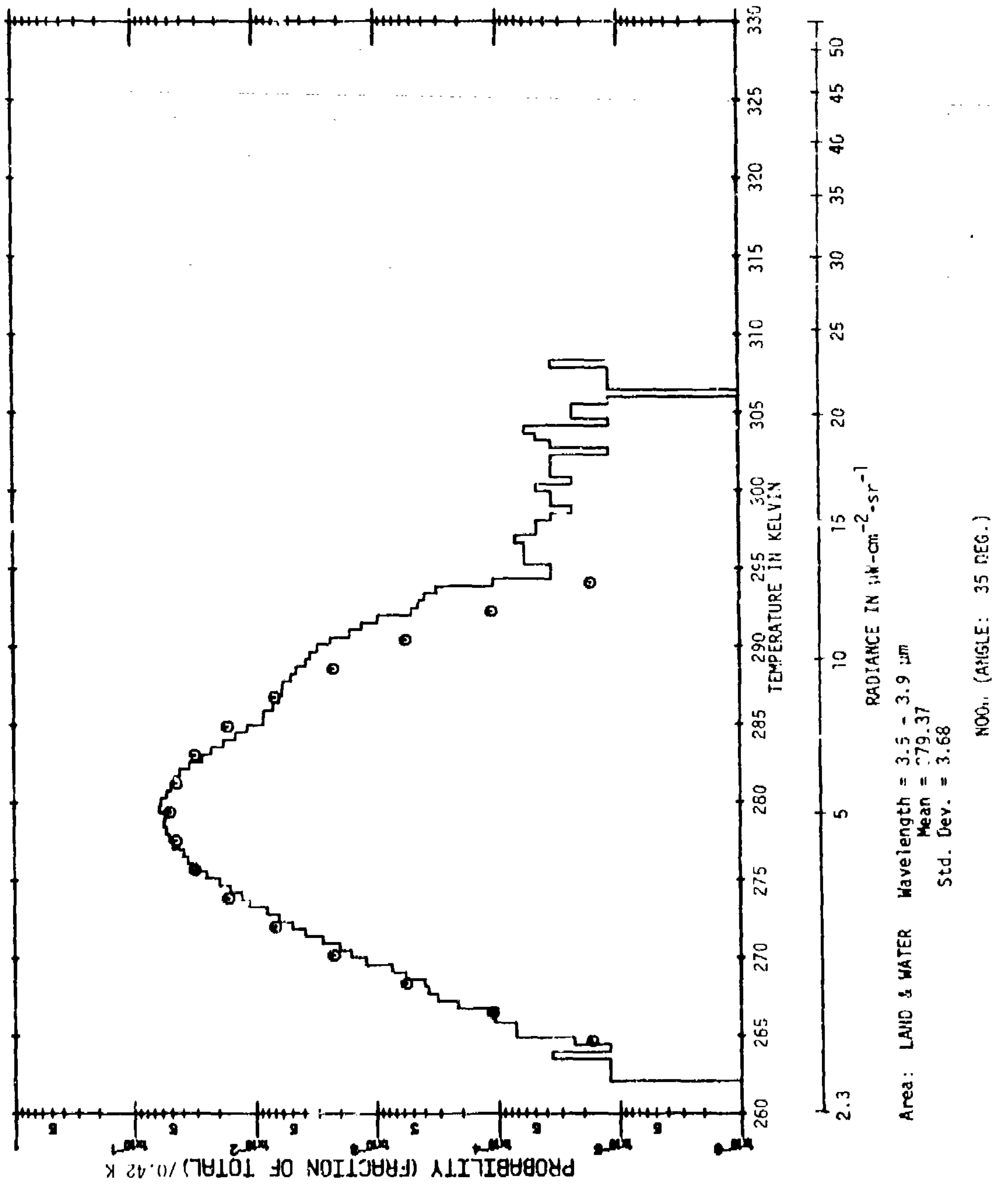
Area: LAND & WATER Wavelength = 3.5 - 3.9 μm
Mean = 281.20
Std. Dev. = 4.12

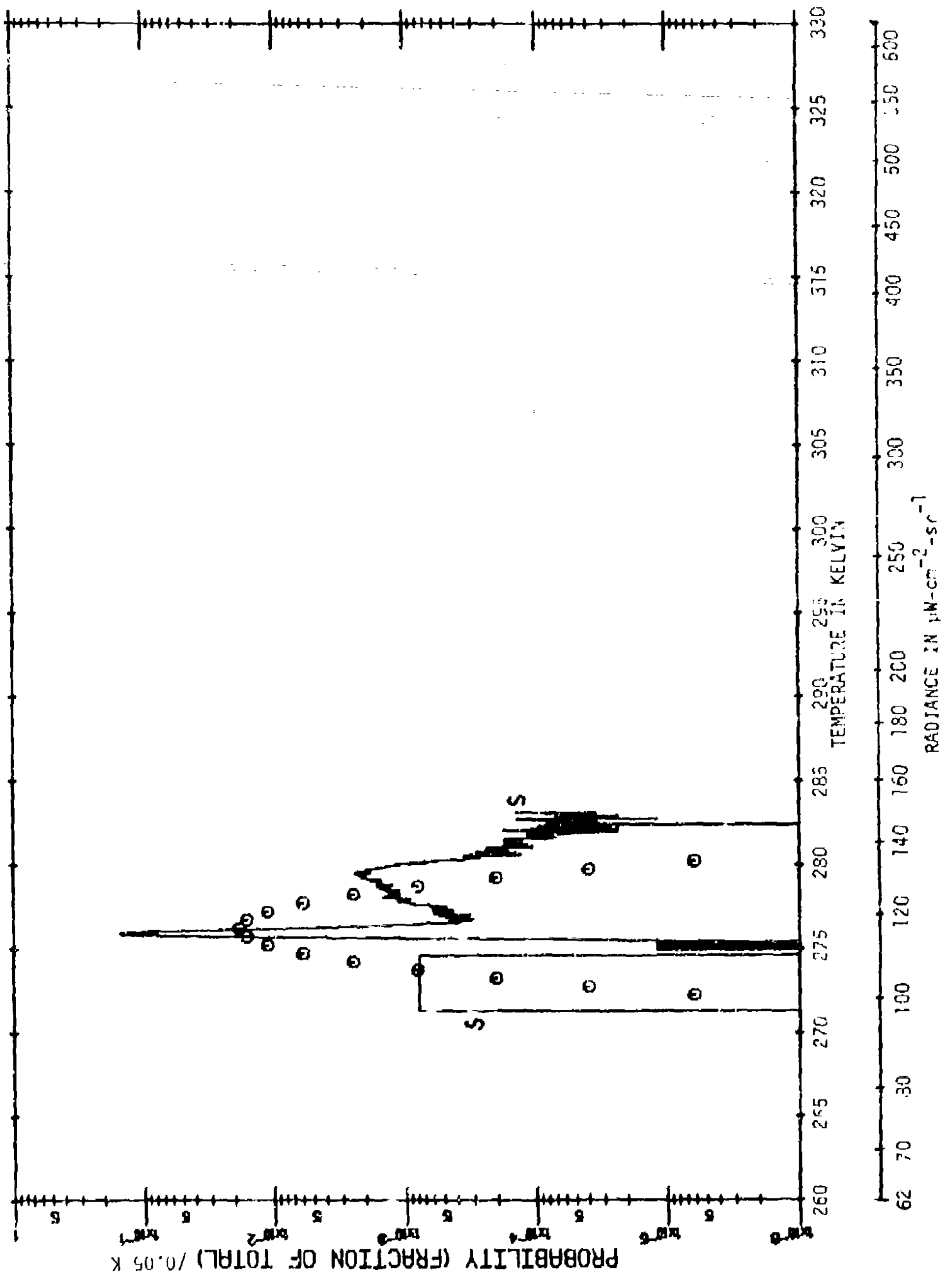
NOON (ANGLE. 90 DEG.)



TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^-2-sr^-1
70 80 100 120 140 160 180 200 250 300 350 400 450 500 550 600
PROBABILITY (FRACTION OF TOTAL)/0.04 K
LAND & WATER Wavelength = 4.5 - 5.5 μm
Mean = 276.81
Std. Dev. = 1.20
NOON (ANGLE: 90 DEG.)

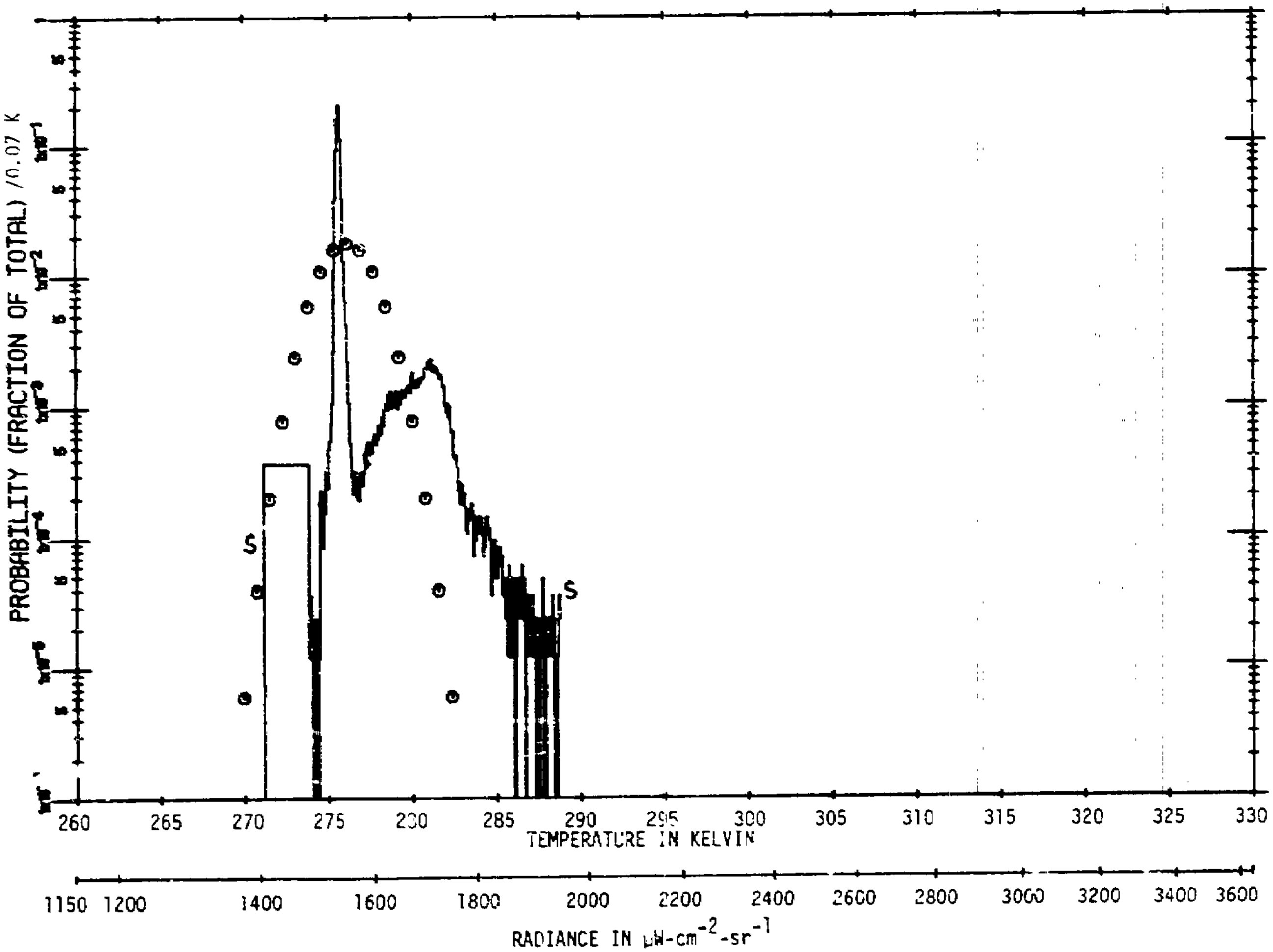

PROBABILITY (FRACTION OF TOTAL)/0.07 K
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
1150 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600
Area: LAND & WATER
Wavelength = 9.0 - 11.4 μm
Mean = 277.47
Std. Dev. = 1.70
NOON (ANGLE: 90 DEG.)


PROBABILITY (FRACTION OF TOTAL)/0.42 K
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN µW-cm^{-2}-sr^{-1}
2.3 5 10 15 20 25 30 35 40 45 50
Area: LAND & WATER
Wavelength = 3.5 - 3.9 µm
Mean = 279.37
Std. Dev. = 3.68
NOON (ANGLE: 35 DEG.)



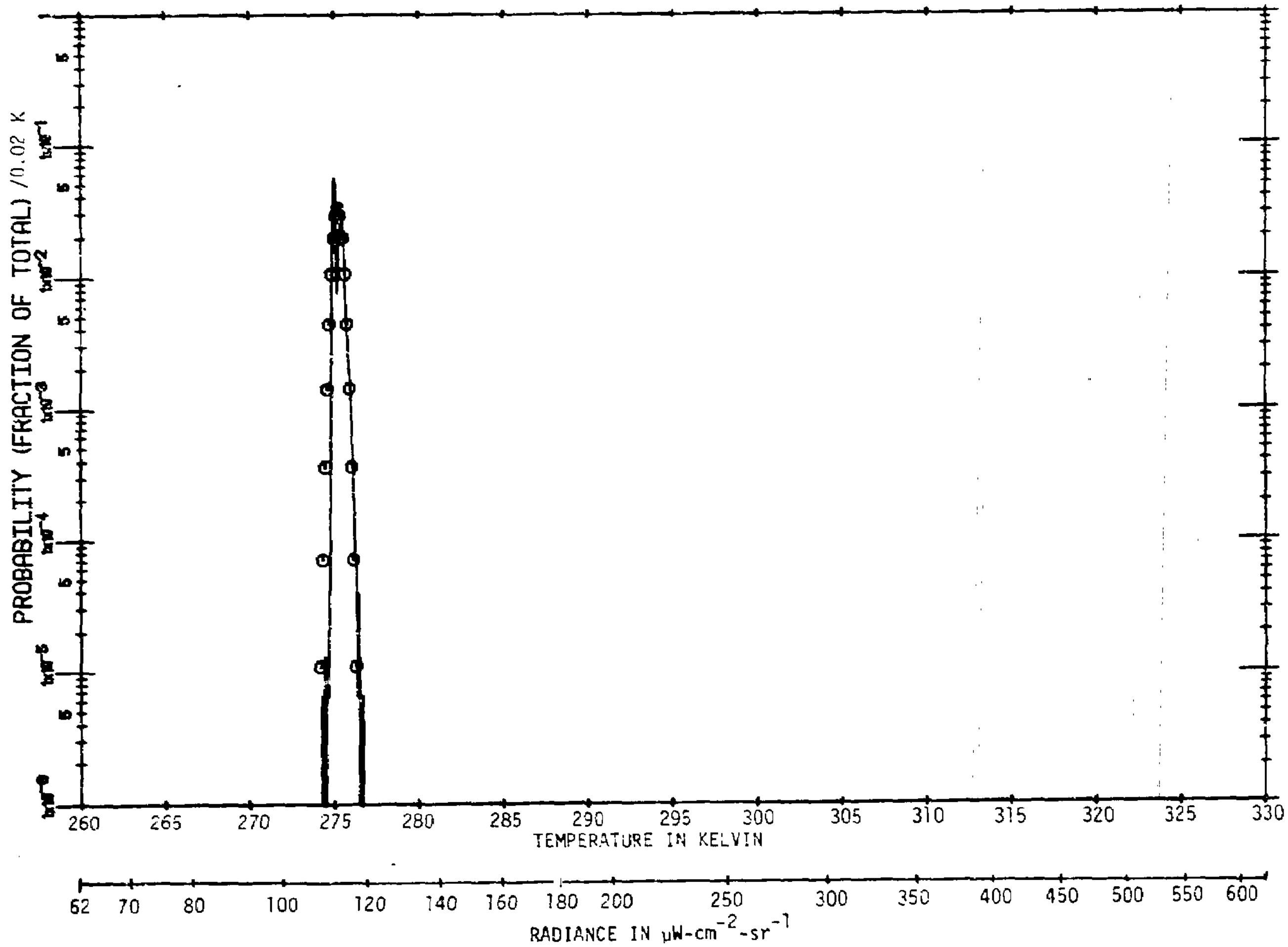
Area: LAND & WATER Wavelength = 4.5 - 5.5 µm
Mean = 276.23
Std. Dev. = 1.00

MOON (ANGLE: 35 DEG.)



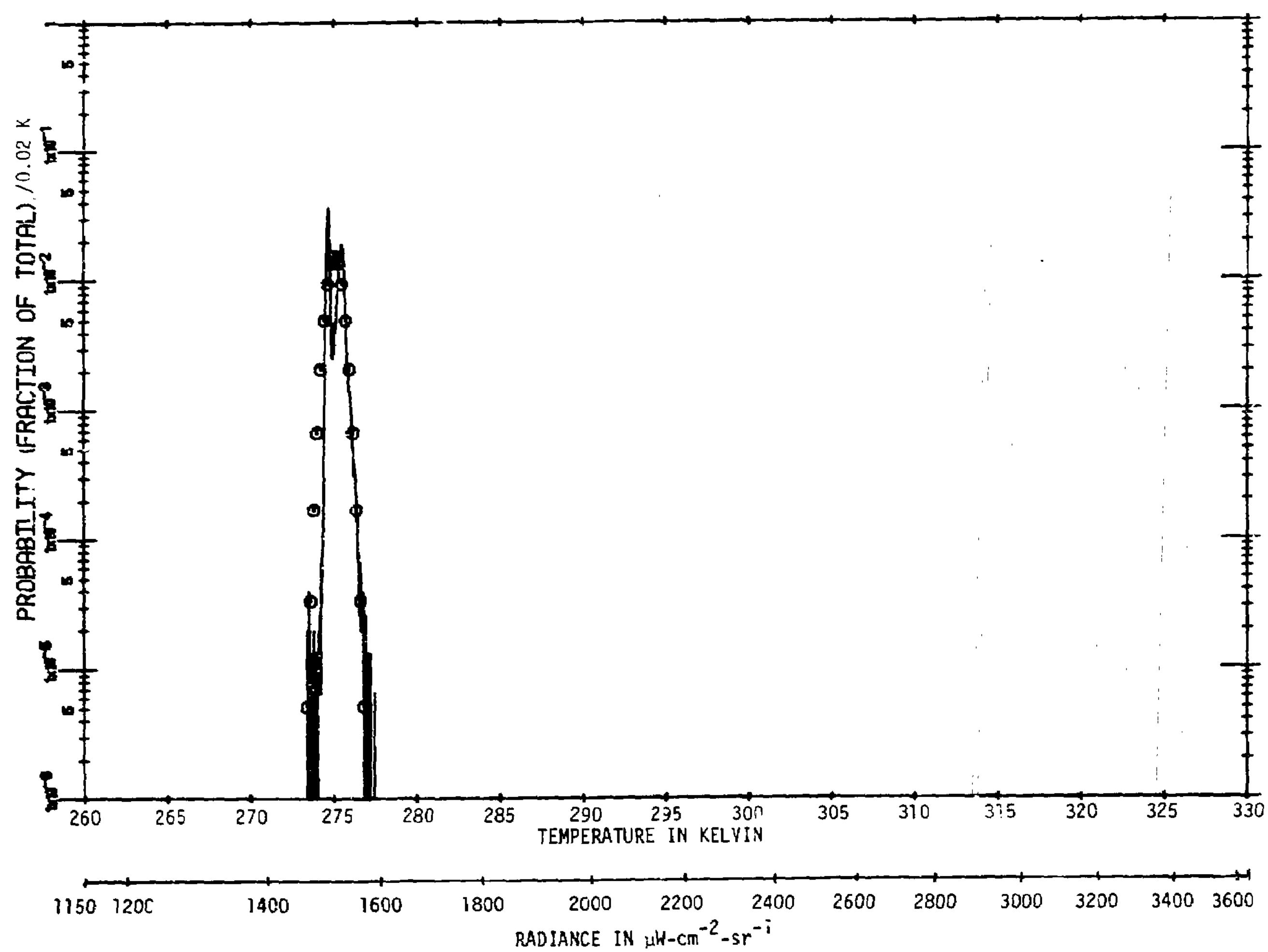
Area: LAND & WATER   Wavelength = 9.0 - 11.4 µm
Mean = 276.16
Std. Dev. = 1.55

NOON (ANGLE: 35 DEG.)



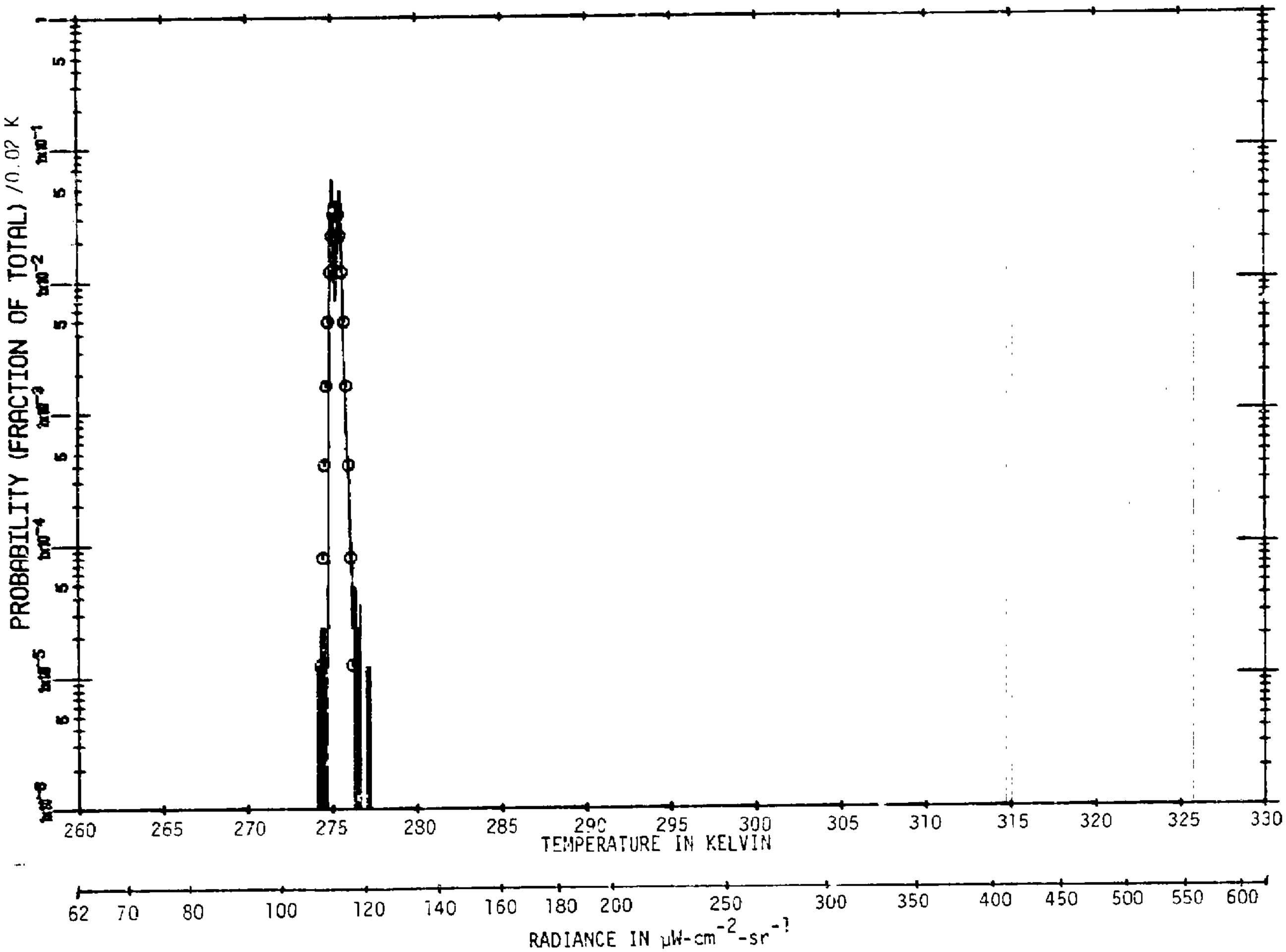
Area: LAND & WATER   Wavelength = 4.5 - 5.5 µm
Mean = 275.25
Std. Dev. = 0.26

SUNSET (ANGLE: 90 DEG.)



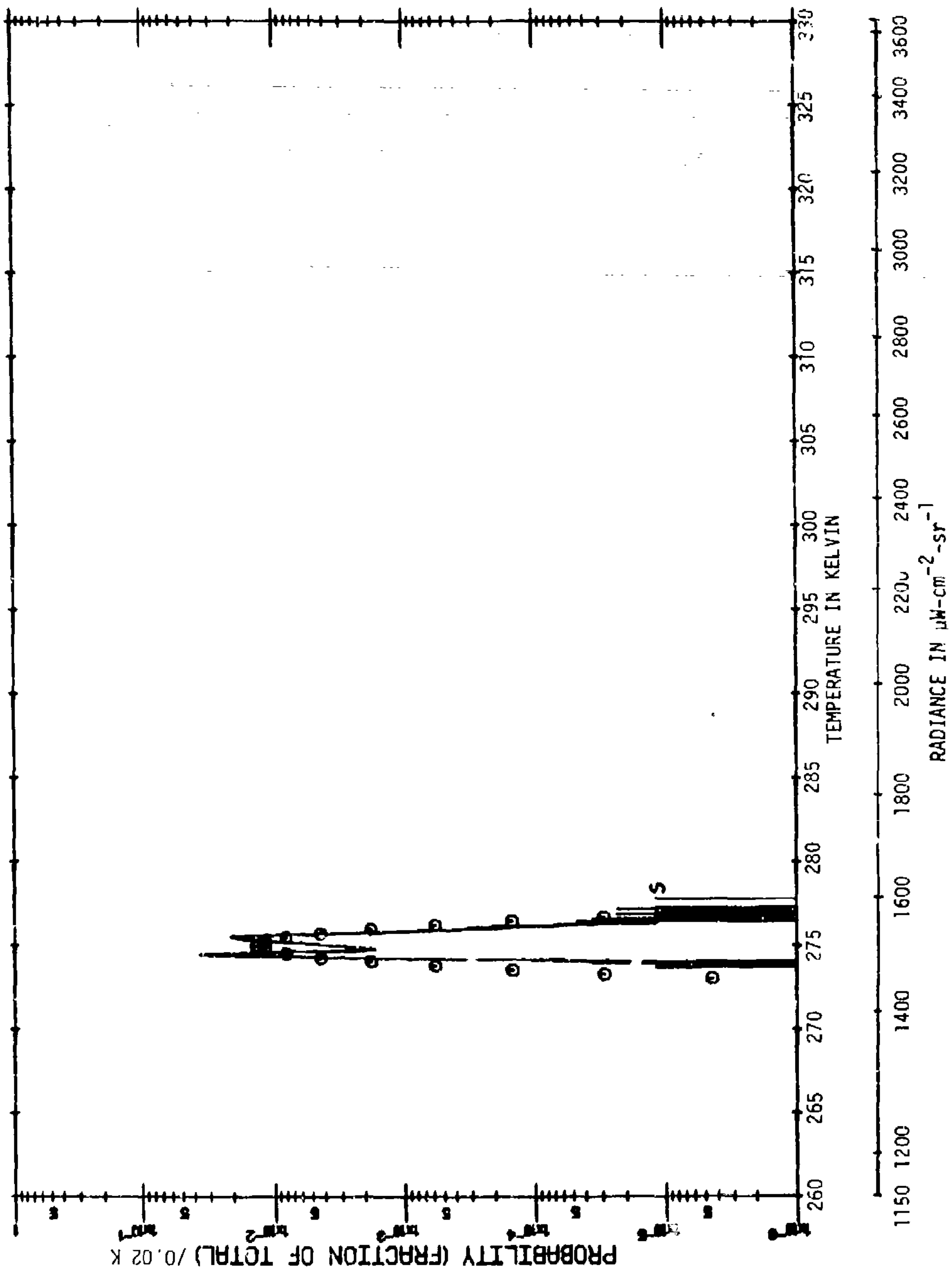
Area: LAND & WATER Wavelength = 9.0 - 11.4 μm
Mean = 275.12
Std. Dev. = 0.43

SUNSET (ANGLE: 90 DEG.)



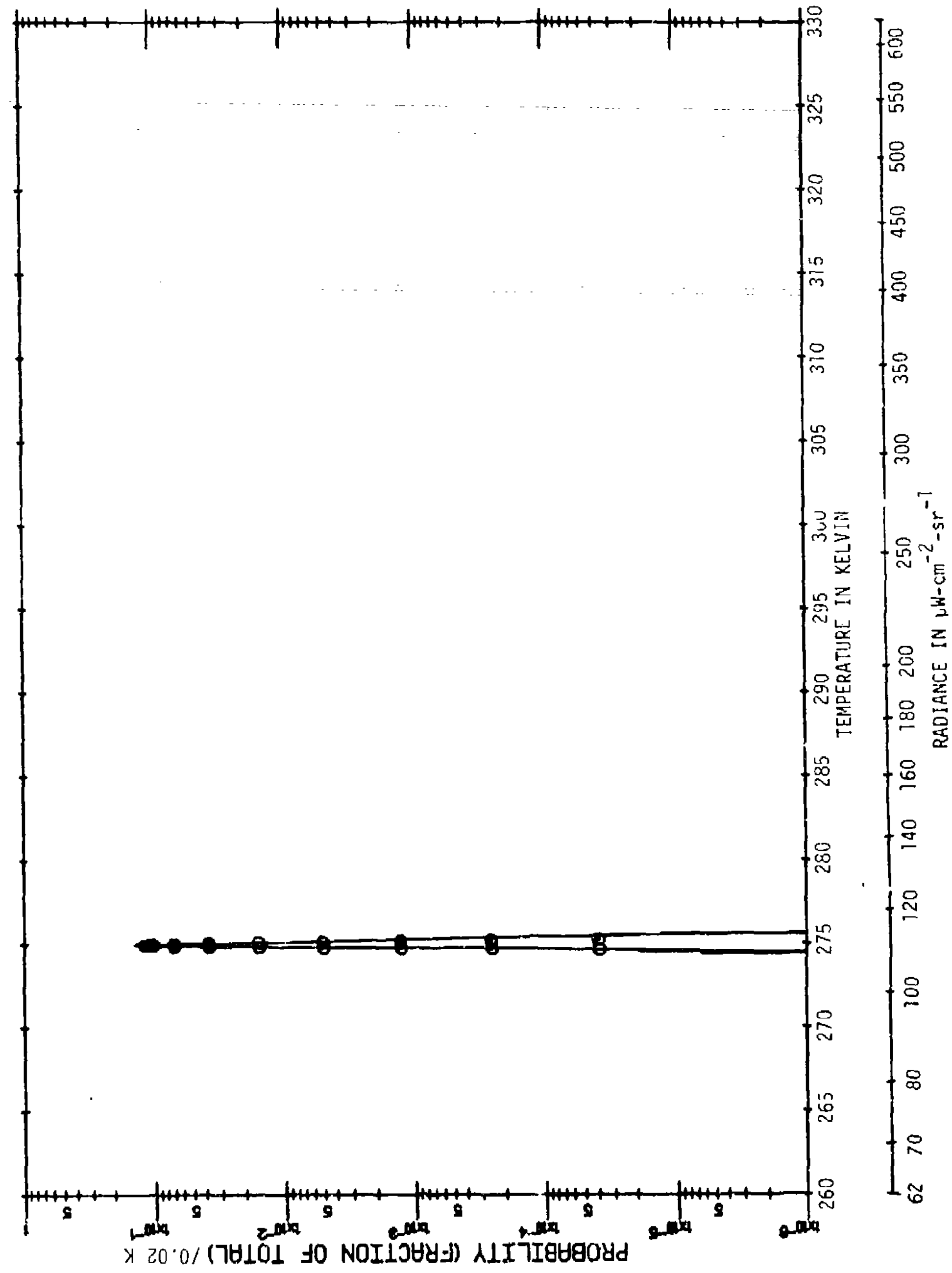
Area: LAND & WATER   Wavelength = 4.5 - 5.5 um
Mean = 275.29
Std. Dev. = 0.24

SUNSET (ANGLE: 35 DEG.)



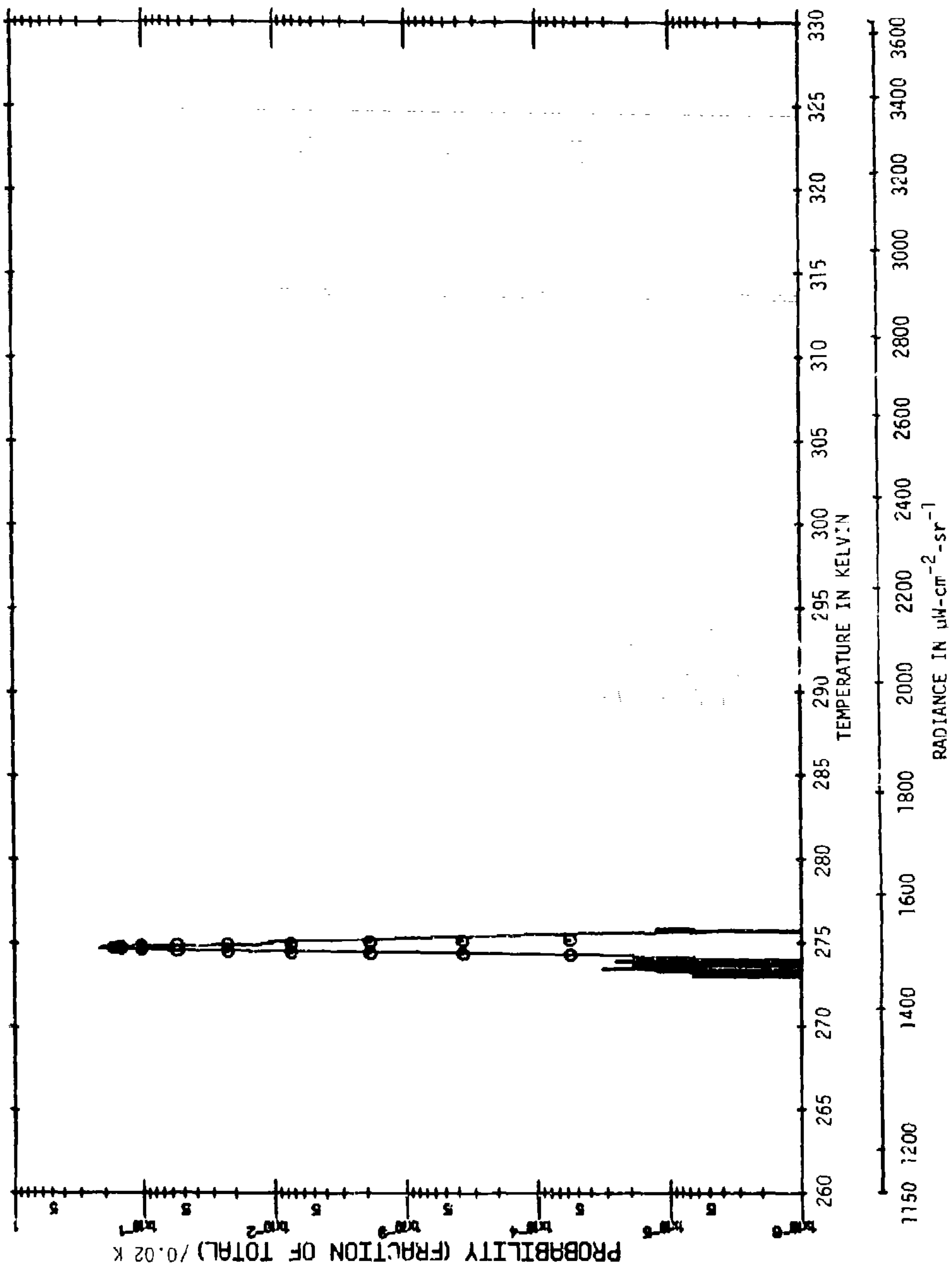
Area: LAND & WATER Wavelength = 9.0 - 11.4 μm
Mean = 274.97
Std. Dev. = 0.49

SUNSET (ANGLE: 35 DEG.)



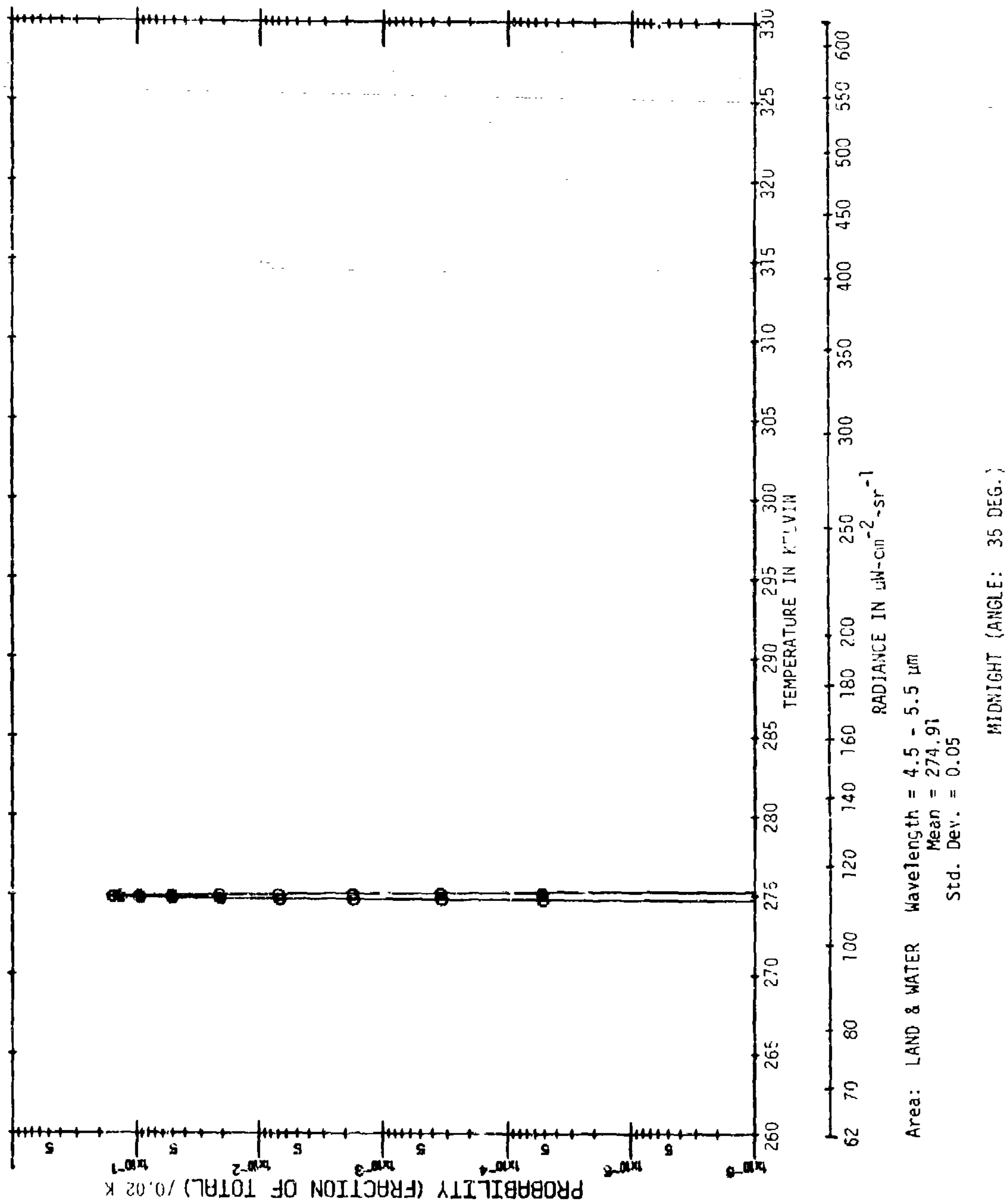
Area: LAND & WATER Wavelength = 4.5 - 5.5 μm
Mean = 274.96
Std. Dev. = 0.07

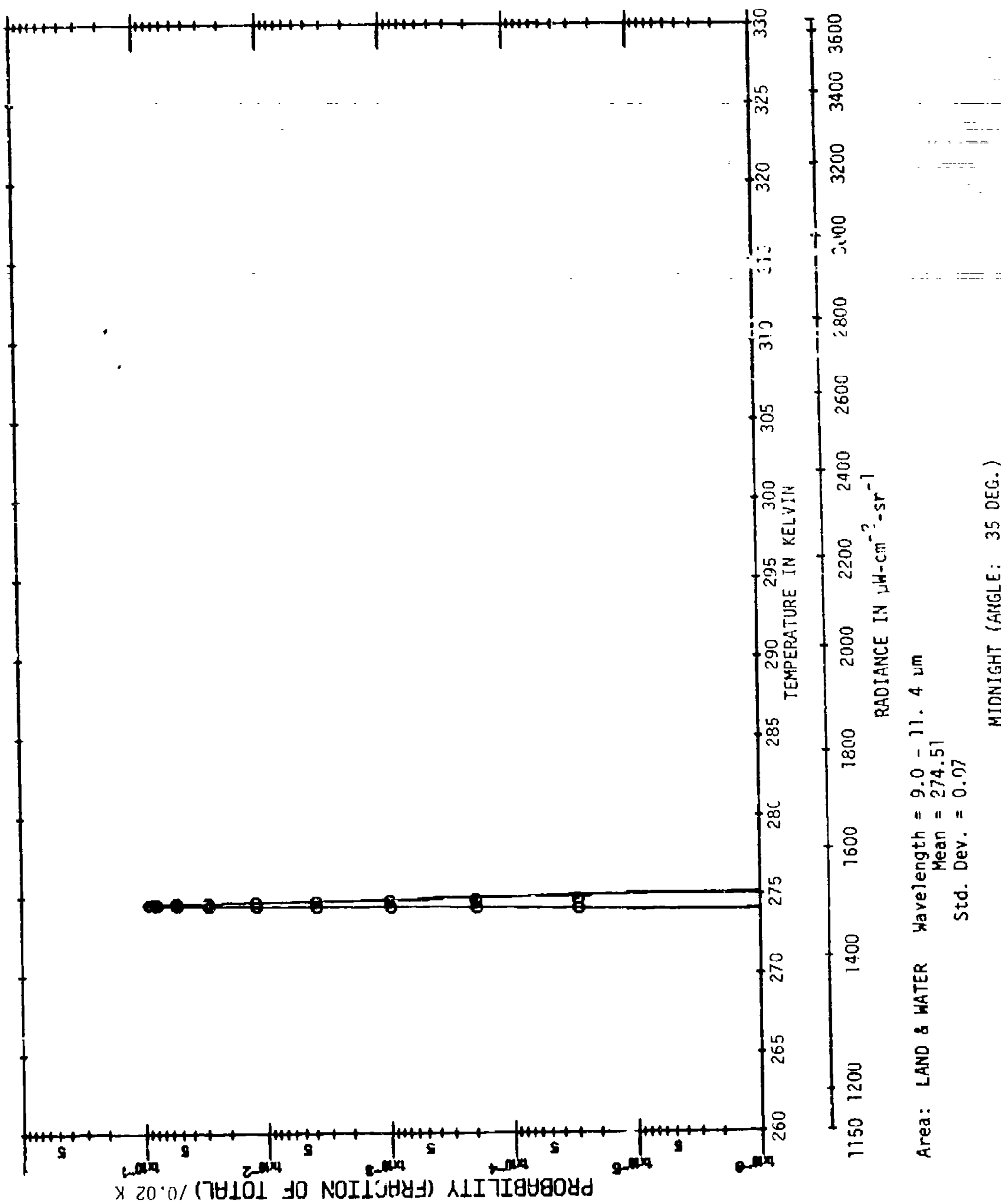
MIDNIGHT (ANGLE: 90 DEG.)



Area: LAND & WATER Wavelength = 9.0 - 11.4 μm
Mean = 274.74
Std. Dev. = 0.11

MIDNIGHT (ANGLE: 90 DEG.)


PROBABILITY (FRACTION OF TOTAL)/0.02 K
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
62 70 80 100 120 140 160 180 200 250 300 350 400 450 500 550 600
Area: LAND & WATER
Wavelength = 4.5 - 5.5 μm
Mean = 274.91
Std. Dev. = 0.05
MIDNIGHT (ANGLE: 35 DEG.)



TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
1150 1200 1400 1600 1800 2000 2200 2400 2600 2800 3000 3200 3400 3600
PROBABILITY (FRACTION OF TOTAL)/0.02 K
Area: LAND & WATER
Wavelength = 9.0 - 11. 4 μm
Mean = 274.51
Std. Dev. = 0.07
MIDNIGHT (ANGLE: 35 DEG.)

ERIM

MICHIGAN WINTER SCENE - LAND & WATER

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands

Spectral Bands:	Channel 8:	3.5 - 3.9 μm (°K)
	Channel 10:	4.5 - 5.5 μm (°K)
	Channel 12:	9.0 - 11.4 μm (°K)

ERIM

LAND & WATER - PRE-DAWN

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.654	1.000

Channels	10	12
Mean	2.7505E+02	2.7487E+02
Standard Deviation	1.1105E-01	1.7481E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.724	1.000

Channels	10	12
Mean	2.7496E+02	2.7464E+02
Standard Deviation	9.6316E-02	1.6107E-01
Total Points	84400.	84400.

LAND & WATER – NOON

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels. 8 (3.5 – 3.9 μm)
10 (4.5 – 5.5 μm)
12 (9.0 – 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 385

Correlation	8	10	12
8	1.000		
10	0.313	1.000	
12	0.345	0.793	1.000

Channels	8	10	12
Mean	2.8120E+02	2.7681E+02	2.7747E+02
Standard Deviation	4.1248E+00	1.1984E+00	1.6994E+00
Total Points	153200.	153200.	153200.

35° Depression

Pixel Subarea Divisions At: 123 523

Line Subarea Divisions At: 1 211

Correlation	8	10	12
8	1.000		
10	0.541	1.000	
12	0.565	0.905	1.000

Channels	8	10	12
Mean	2.7937E+02	2.7623E+02	2.7616E+02
Standard Deviation	3.6773E+00	9.9948E-01	1.5471E+00
Total Points	83600.	83600.	83600.

ERIM

MICHIGAN WINTER SCENE - LAND & WATER

Ellipse Statistics

Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

LAND & WATER - SUNSET

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.882	1.000

Channels	10	12
Mean	2.7525E+02	2.7512E+02
Standard Deviation	2.6181E-01	4.2969E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.904	1.000

Channels	10	12
Mean	2.7529E+02	2.7497E+02
Standard Deviation	2.3681E-01	4.8677E-01
Total Points	84400.	84400.

LAND & WATER - MIDNIGHT

Number of Subregions: 1
Line Increment Used: 1
Pixel Increment Used: 1
Correlation Channels: 10 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

90° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 385

Correlation	10	12
10	1.000	
12	0.420	1.000

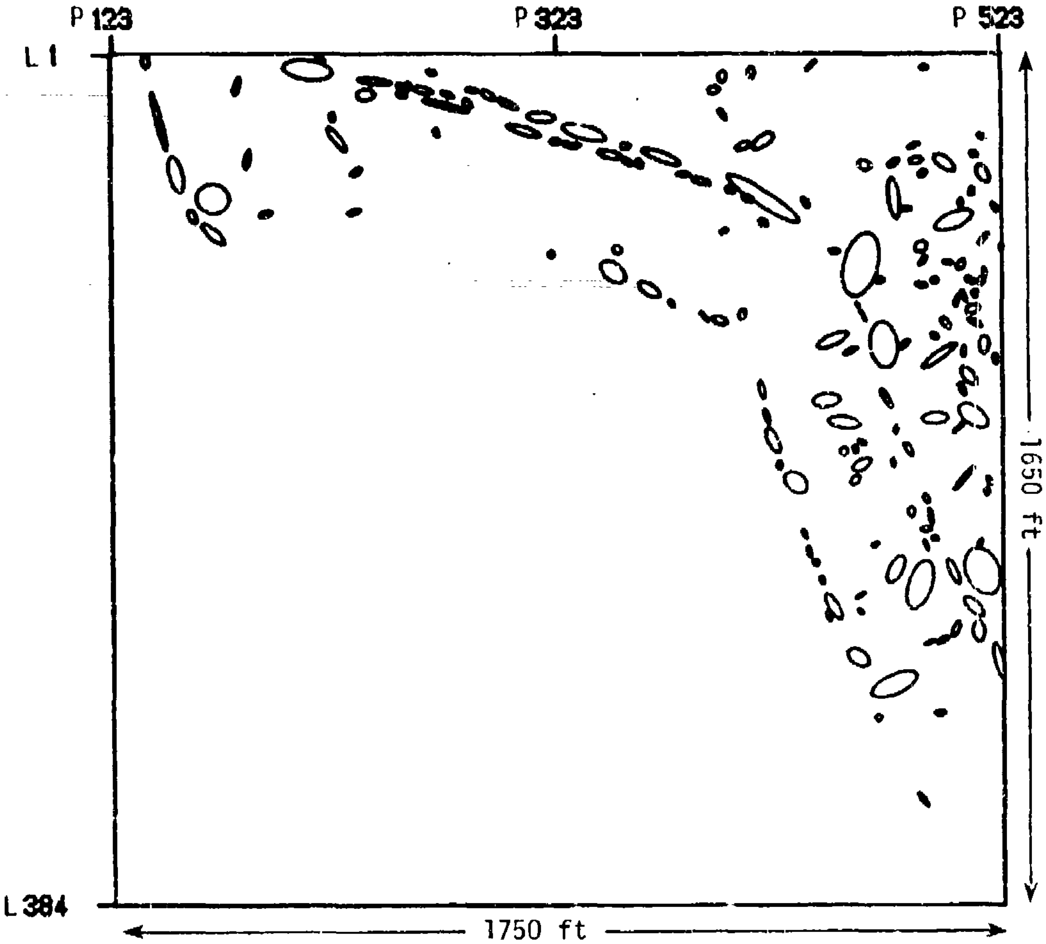
Channels	10	12
Mean	2.7496E+02	2.7474E+02
Standard Deviation	7.3608E-02	1.0586E-01
Total Points	154000.	154000.

35° Depression

Pixel Subarea Divisions At: 123 523
Line Subarea Divisions At: 1 211

Correlation	10	12
10	1.000	
12	0.023	1.000

Channels	10	12
Mean	2.7491E+02	2.7451E+02
Standard Deviation	5.3676E-02	7.2946E-02
Total Points	84400.	84400.



Area: LAND & WATER - Pre-Dawn (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.15 σ

Mean = 275.05 Kelvin

Std. Dev. = σ = 0.11 Kelvin

EQUIVALENT ELLIPTICAL AREAS

∑ERIM

LAND & WATER - PRE-DAWN
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.15 σ
Wavelength = 4.5 - 5.5 μm
Mean = 275.05 Kelvin
σ = 0.11 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	26
10.0 TO	15.0	40
15.0 TO	20.0	25
20.0 TO	25.0	13
25.0 TO	30.0	5
30.0 TO	35.0	6
35.0 TO	40.0	3
40.0 TO	45.0	1
45.0 TO	50.0	4
50.0 TO	75.0	14
75.0 TO	100.0	9
100.0 TO	150.0	7
150.0 TO	200.0	3
200.0 TO	250.0	0
250.0 TO	300.0	3
300.0 TO	400.0	3
400.0 TO	500.0	1
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 164

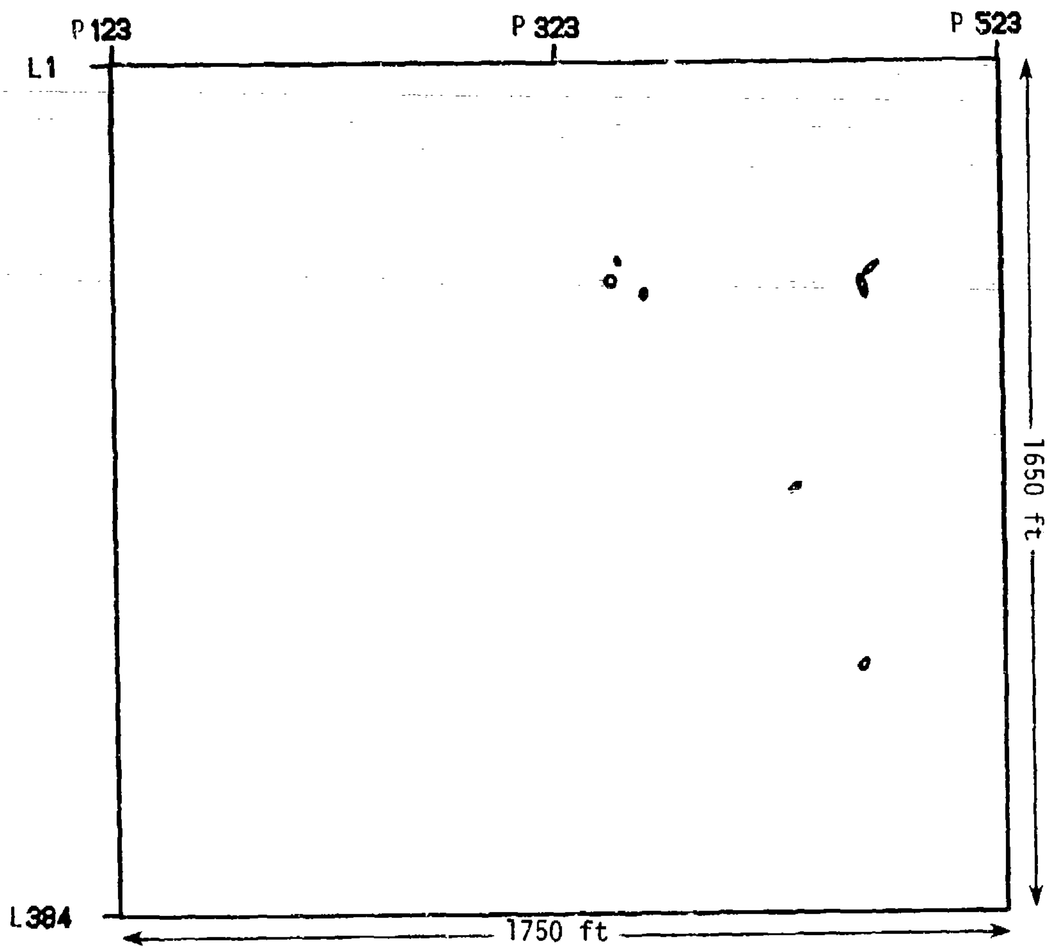
747 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	6
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	10
17 TO 20	55 TO 65	15
20 TO 22	65 TO 72	17
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	14
26 TO 28	85 TO 91	6
28 TO 30	91 TO 98	10
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	22
39 TO 45	127 TO 147	8
45 TO 55	147 TO 180	7
55 TO 71	180 TO 232	5
71 TO 100	232 TO 328	17
OVER 100	OVER 328	27

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	7
1.3 TO 1.4	1
1.4 TO 1.5	6
1.5 TO 1.6	13
1.6 TO 1.7	8
1.7 TO 1.8	14
1.8 TO 1.9	8
1.9 TO 2.0	6
2.0 TO 2.4	34
2.4 TO 2.6	18
2.6 TO 2.8	7
2.8 TO 3.0	9
3.0 TO 3.5	11
3.5 TO 4.0	8
4.0 TO 4.5	3
OVER 4.5	10



Area. LAND & WATER - Pre-dawn (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.71 σ

Mean = 275.05 Kelvin

Std. Dev. = σ = 0.11 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

LAND & WATER - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.71 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.05 Kelvin

σ = 0.11 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	1
10.0 TO	15.0	1
15.0 TO	20.0	1
20.0 TO	25.0	1
25.0 TO	30.0	1
30.0 TO	35.0	1
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 7

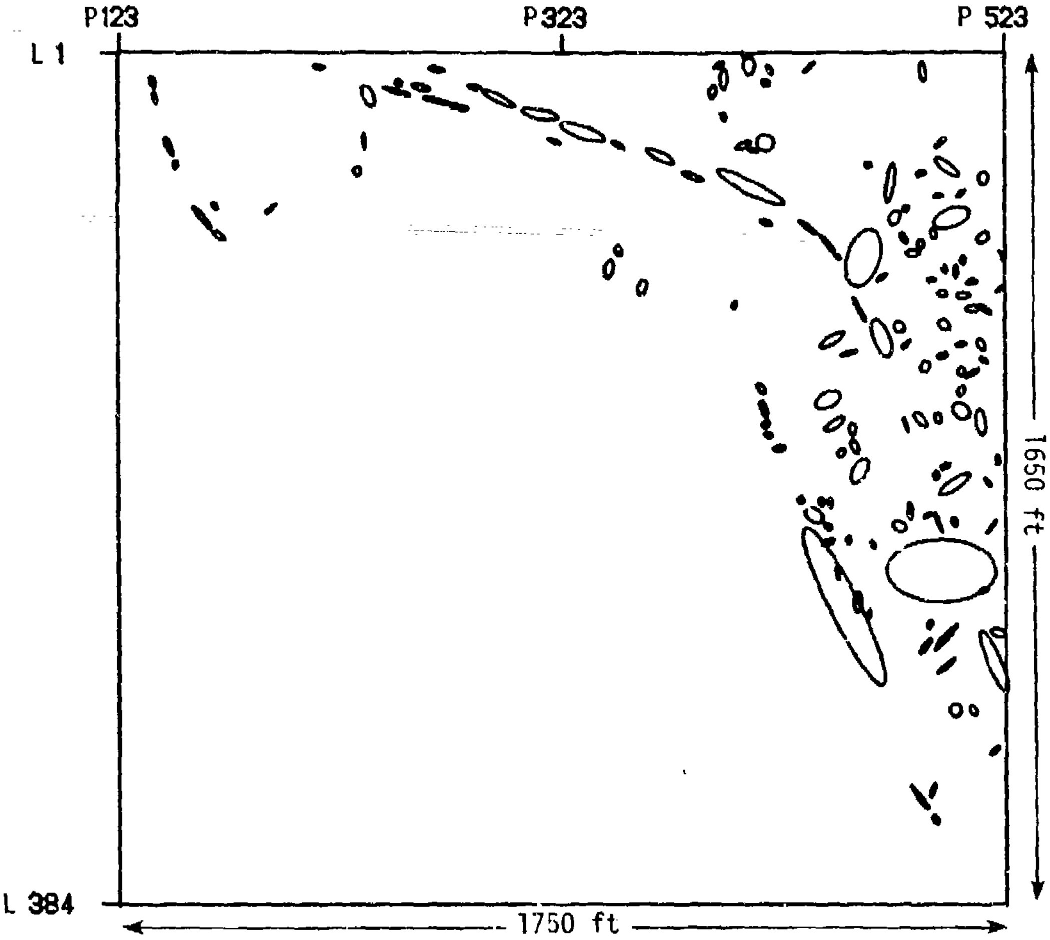
34 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	1
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	2
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	1
1.3 TO 1.4	0
1.4 TO 1.5	0
1.5 TO 1.6	2
1.6 TO 1.7	1
1.7 TO 1.8	1
1.8 TO 1.9	2
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Pre-dawn (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.09 σ

Mean = 274.87 Kelvin

Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.09 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.87 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	25
10.0	TO	15.0	37
15.0	TO	20.0	20
20.0	TO	25.0	13
25.0	TO	30.0	6
30.0	TO	35.0	8
35.0	TO	40.0	7
40.0	TO	45.0	3
45.0	TO	50.0	2
50.0	TO	75.0	9
75.0	TO	100.0	4
100.0	TO	150.0	2
150.0	TO	200.0	3
200.0	TO	250.0	1
250.0	TO	300.0	1
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 144

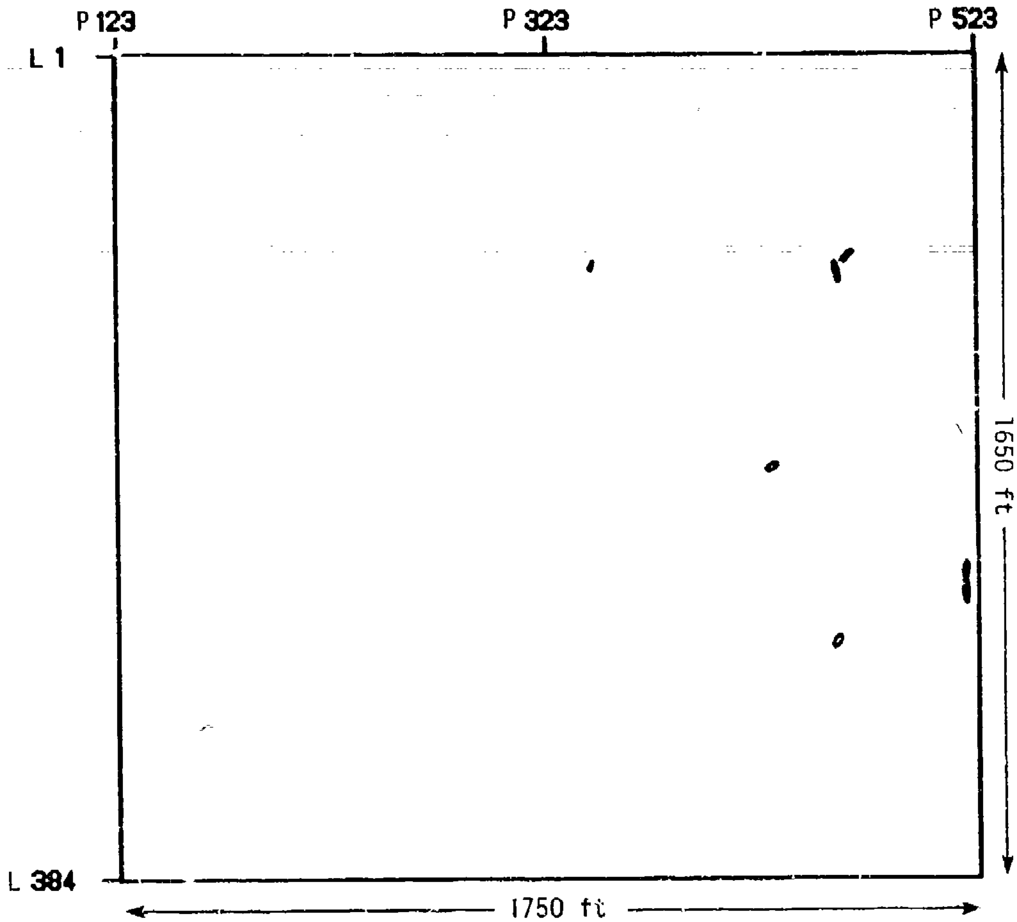
346 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	8
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	13
17	TO	20	55	TO	65	21
20	TO	22	65	TO	72	15
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	8
26	TO	28	85	TO	91	9
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	16
39	TO	45	127	TO	147	14
45	TO	55	147	TO	180	7
55	TO	71	180	TO	232	5
71	TO	100	232	TO	328	10
	OVER	100		OVER	328	10

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	2
1.2	TO	1.3	10
1.3	TO	1.4	6
1.4	TO	1.5	6
1.5	TO	1.6	14
1.6	TO	1.7	12
1.7	TO	1.8	19
1.8	TO	1.9	10
1.9	TO	2.0	5
2.0	TO	2.4	32
2.4	TO	2.6	7
2.6	TO	2.8	8
2.8	TO	3.0	2
3.0	TO	3.5	5
3.5	TO	4.0	1
4.0	TO	4.5	1
	OVER	4.5	3



Area: LAND & WATER - Pre-dawn (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.66 σ

Mean = 274.87 Kelvin

Std. Dev. = σ = 0.17 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

LAND & WATER - PRE-DAWN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.66 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.87 Kelvin

σ = 0.17 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	1
10.0	TO	15.0	0
15.0	TO	20.0	1
20.0	TO	25.0	2
25.0	TO	30.0	2
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 7

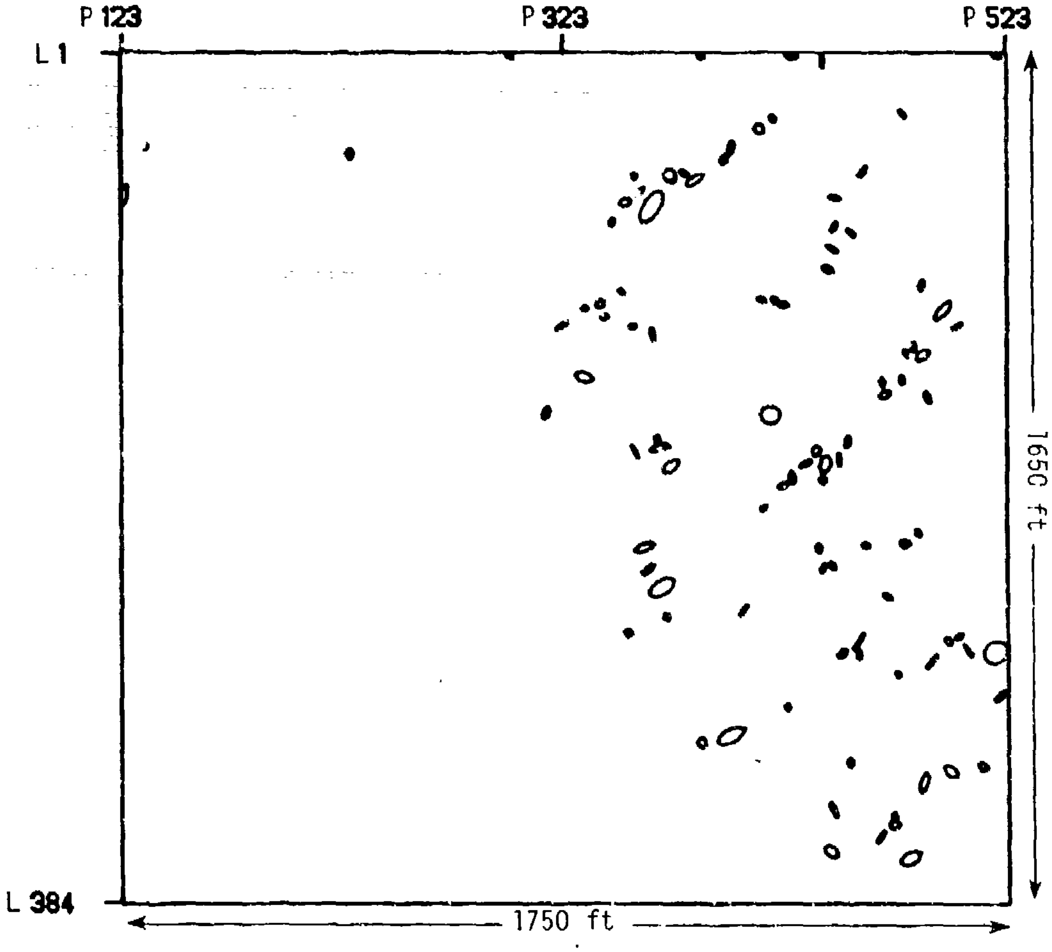
18 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	3
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	1
1.5 TO 1.6	1
1.6 TO 1.7	0
1.7 TO 1.8	2
1.8 TO 1.9	2
1.9 TO 2.0	1
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Noon (Wavelength = 3.5 - 3.9 μm)

Temperature Threshold = Mean + 1.83 σ

Mean = 281.20 Kelvin

Std. Dev. = σ = 4.12 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.83 σ

Wavelength = 3.5 - 3.9 μm

Mean = 281.20 Kelvin

σ = 4.12 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	22
10.0 TO	15.0	29
15.0 TO	20.0	20
20.0 TO	25.0	8
25.0 TO	30.0	1
30.0 TO	35.0	1
35.0 TO	40.0	4
40.0 TO	45.0	4
45.0 TO	50.0	3
50.0 TO	75.0	2
75.0 TO	100.0	1
100.0 TO	150.0	3
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 99

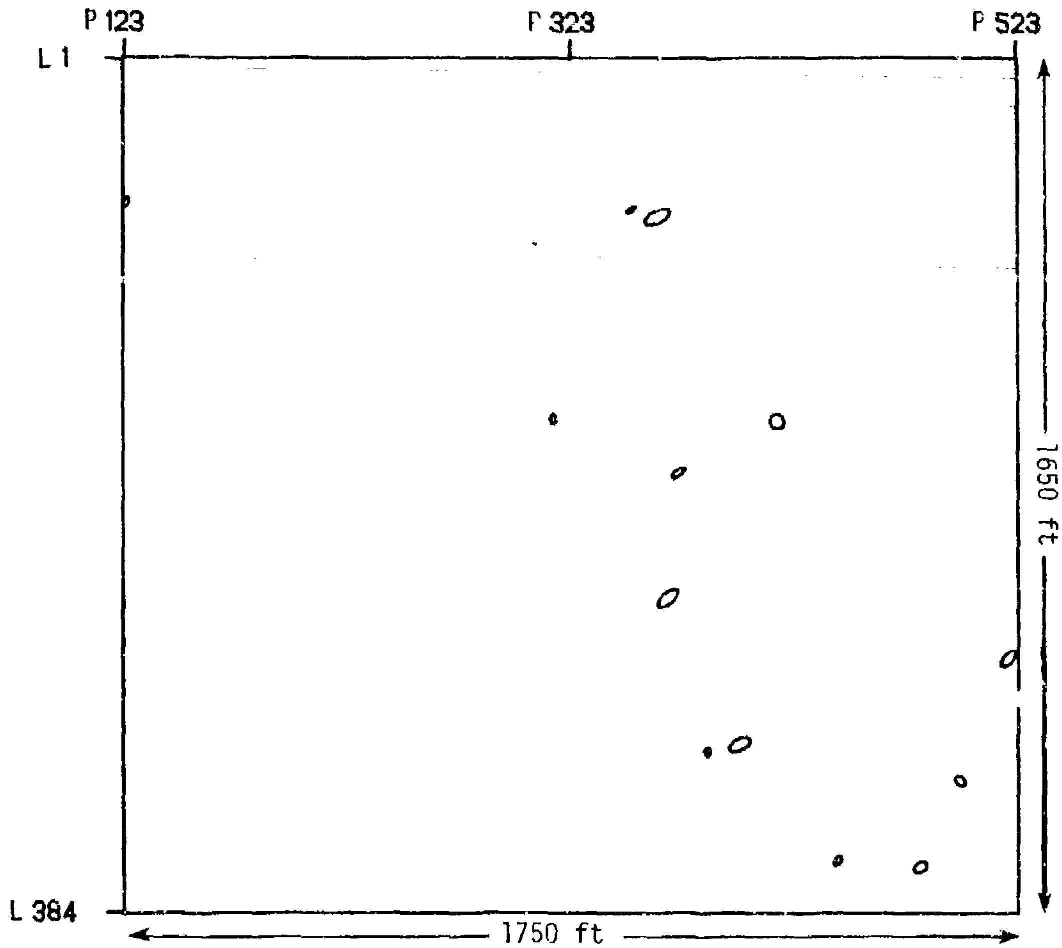
1890 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	4
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	10
17 TO	20	55 TO	65	7
20 TO	22	65 TO	72	10
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	13
26 TO	28	85 TO	91	11
28 TO	30	91 TO	98	7
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	15
39 TO	45	127 TO	147	4
45 TO	55	147 TO	180	5
55 TO	71	180 TO	232	6
71 TO	100	232 TO	328	5
OVER	100	OVER	328	2

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	4
1.3 TO 1.4	6
1.4 TO 1.5	2
1.5 TO 1.6	7
1.6 TO 1.7	3
1.7 TO 1.8	12
1.8 TO 1.9	7
1.9 TO 2.0	5
2.0 TO 2.4	36
2.4 TO 2.6	5
2.6 TO 2.8	4
2.8 TO 3.0	1
3.0 TO 3.5	4
3.5 TO 4.0	1
4.0 TO 4.5	1
OVER 4.5	0



Area: LAND & WATER - Noon (Wavelength = 3.5 - 3.9 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 281.20 Kelvin

Std. Dev. = σ = 4.12 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

LAND & WATER - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 3.5 - 3.9 μm

Mean = 281.20 Kelvin

σ = 4.12 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	0
10.0 TO	15.0	3
15.0 TO	20.0	2
20.0 TO	25.0	1
25.0 TO	30.0	1
30.0 TO	35.0	0
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	4
75.0 TO	100.0	1
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 13

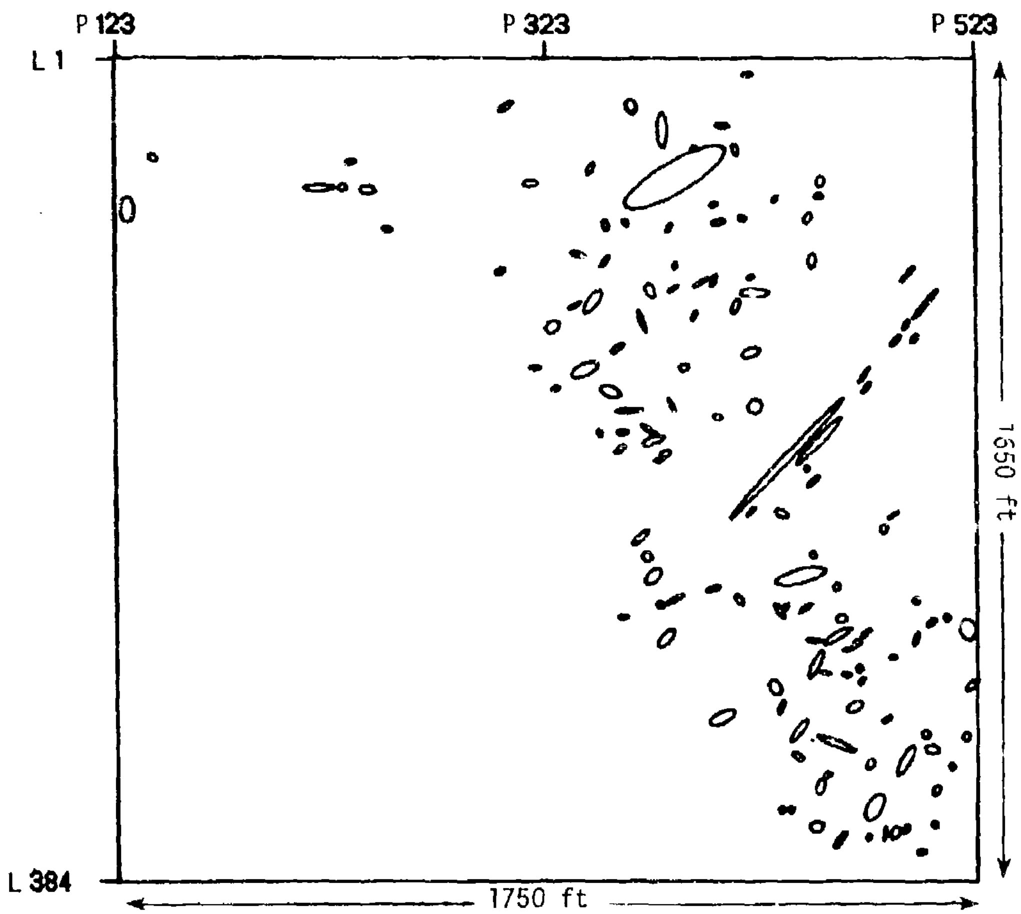
60 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	1
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	0
17 TO	20	55 TO	65	3
20 TO	22	65 TO	72	1
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	0
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	2
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	2
55 TO	71	180 TO	232	3
71 TO	100	232 TO	328	0
OVER	100	OVER	328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	0
1.3 TO 1.4	3
1.4 TO 1.5	0
1.5 TO 1.6	3
1.6 TO 1.7	2
1.7 TO 1.8	1
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	2
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Noon (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 276.81 Kelvin

Std. Dev. = σ = 1.20 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - NOON
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 276.81 Kelvin

σ = 1.20 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	16
10.0	TO	15.0	34
15.0	TO	20.0	24
20.0	TO	25.0	17
25.0	TO	30.0	8
30.0	TO	35.0	3
35.0	TO	40.0	7
40.0	TO	45.0	1
45.0	TO	50.0	5
50.0	TO	75.0	11
75.0	TO	100.0	4
100.0	TO	150.0	4
150.0	TO	200.0	1
200.0	TO	250.0	1
250.0	TO	300.0	0
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 138

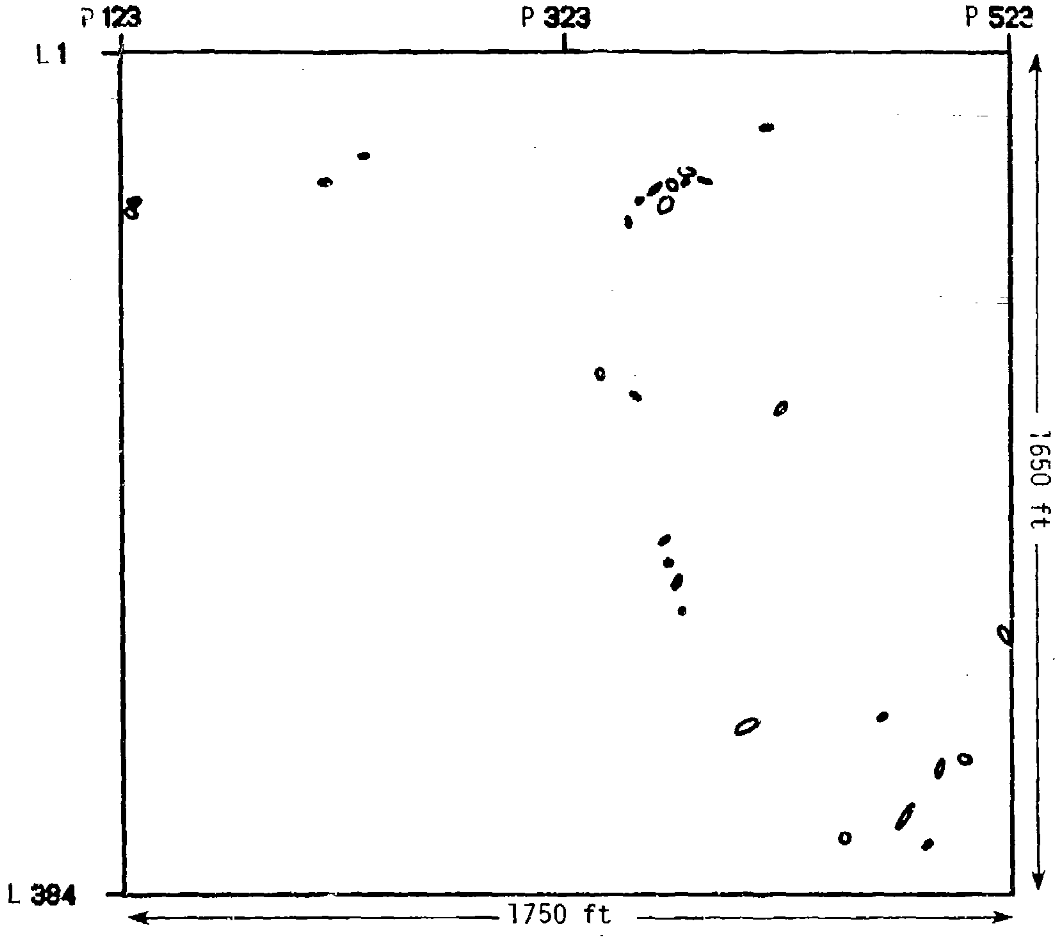
190 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	12
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	18
17	TO	20	55	TO	65	16
20	TO	22	65	TO	72	12
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	14
26	TO	28	85	TO	91	8
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	17
39	TO	45	127	TO	147	7
45	TO	55	147	TO	180	7
55	TO	71	180	TO	232	7
71	TO	100	232	TO	328	5
	OVER	100		OVER	328	7

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	6
1.2	TO	1.3	12
1.3	TO	1.4	20
1.4	TO	1.5	13
1.5	TO	1.6	21
1.6	TO	1.7	8
1.7	TO	1.8	13
1.8	TO	1.9	9
1.9	TO	2.0	5
2.0	TO	2.4	17
2.4	TO	2.6	4
2.6	TO	2.8	2
2.8	TO	3.0	2
3.0	TO	3.5	3
3.5	TO	4.0	2
4.0	TO	4.5	0
	OVER	4.5	1



Area: LAND & WATER - Noon (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 4.15 σ

Mean = 276.81 Kelvin

Std. Dev. = σ = 1.20 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 4.15 σ
Wavelength = 4.5 - 5.5 μm
Mean = 276.81 Kelvin
σ = 1.20 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	4
10.0	TO	15.0	10
15.0	TO	20.0	1
20.0	TO	25.0	3
25.0	TO	30.0	3
30.0	TO	35.0	3
35.0	TO	40.0	2
40.0	TO	45.0	0
45.0	TO	50.0	1
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 29

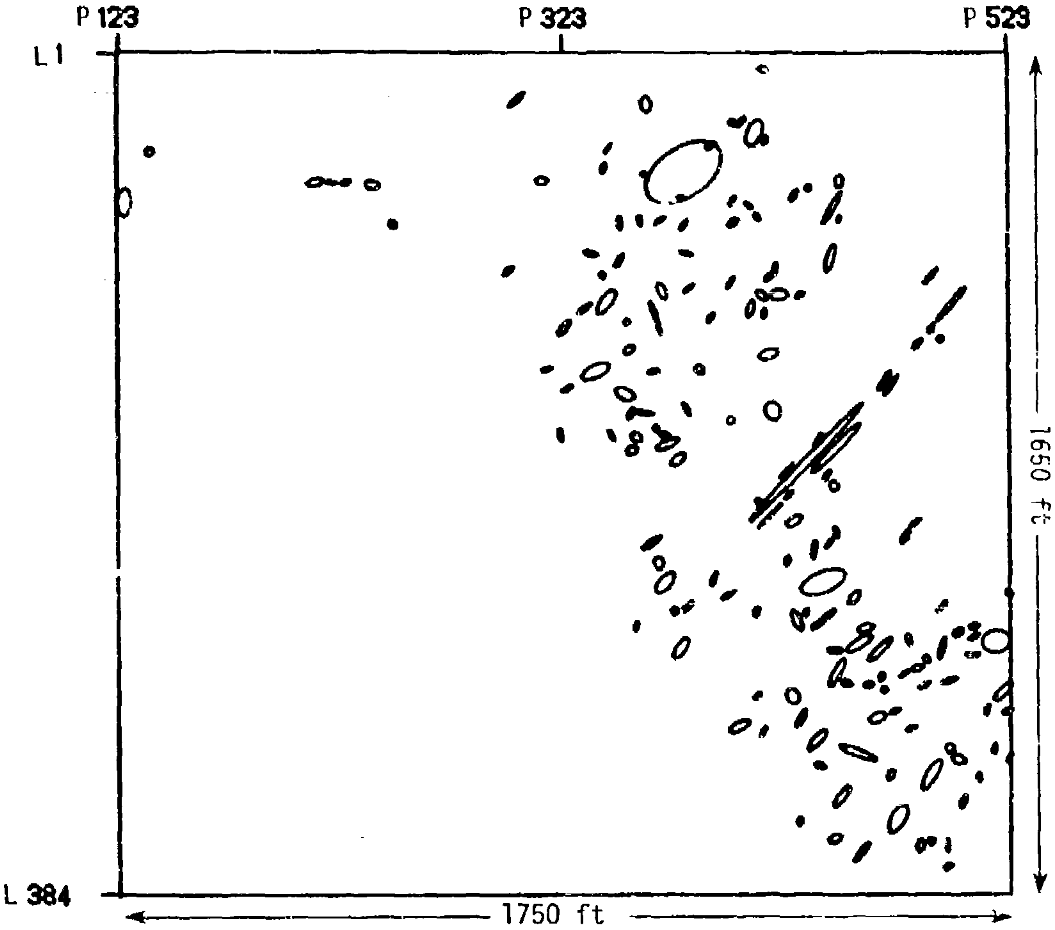
58 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	5
17	TO	20	55	TO	65	4
20	TO	22	65	TO	72	4
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	4
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	2
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	3
55	TO	71	180	TO	232	2
71	TO	100	232	TO	328	1
	OVER	100		OVER	328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	2
1.3	TO	1.4	4
1.4	TO	1.5	3
1.5	TO	1.6	5
1.6	TO	1.7	1
1.7	TO	1.8	6
1.8	TO	1.9	0
1.9	TO	2.0	1
2.0	TO	2.4	3
2.4	TO	2.6	0
2.6	TO	2.8	2
2.8	TO	3.0	1
3.0	TO	3.5	0
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	0



Area: LAND & WATER - Noon (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.35 σ

Mean = 277.47 Kelvin

Std. Dev. = σ = 1.70 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - NOON

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.35 σ

Wavelength = 9.0 - 11.4 μm

Mean = 277.47 Kelvin

σ = 1.70 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	21
10.0 TO	15.0	53
15.0 TO	20.0	27
20.0 TO	25.0	10
25.0 TO	30.0	8
30.0 TO	35.0	10
35.0 TO	40.0	5
40.0 TO	45.0	2
45.0 TO	50.0	3
50.0 TO	75.0	15
75.0 TO	100.0	6
100.0 TO	150.0	4
150.0 TO	200.0	2
200.0 TO	250.0	0
250.0 TO	300.0	1
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 169

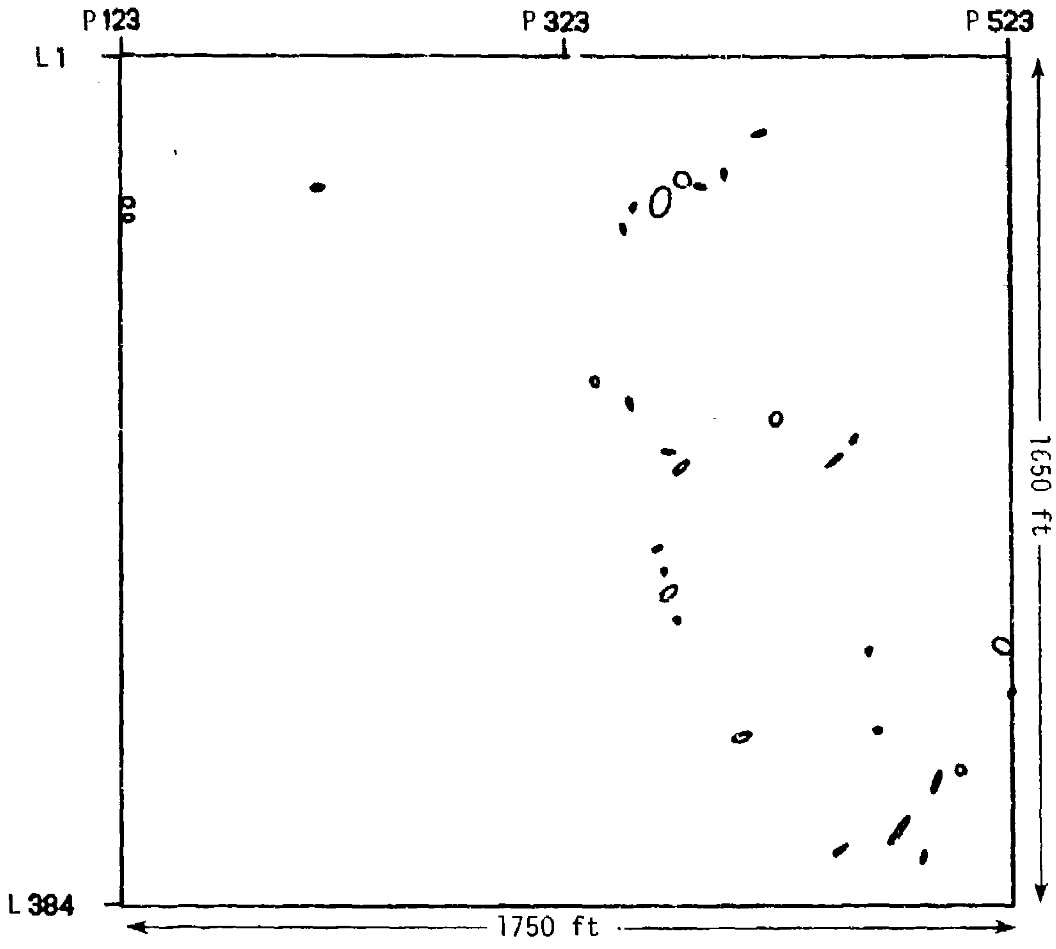
275 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	37 TO	45	5
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	25
17 TO	20	55 TO	65	27
20 TO	22	65 TO	72	18
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	19
26 TO	28	85 TO	91	8
28 TO	30	91 TO	98	8
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	14
39 TO	45	127 TO	147	6
45 TO	55	147 TO	180	11
55 TO	71	180 TO	232	14
71 TO	100	232 TO	328	7
OVER	100	OVER	328	7

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	12
1.3 TO 1.4	19
1.4 TO 1.5	18
1.5 TO 1.6	27
1.6 TO 1.7	10
1.7 TO 1.8	18
1.8 TO 1.9	9
1.9 TO 2.0	13
2.0 TO 2.4	17
2.4 TO 2.6	11
2.6 TO 2.8	4
2.8 TO 3.0	4
3.0 TO 3.5	2
3.5 TO 4.0	1
4.0 TO 4.5	2
OVER 4.5	1



Area: LAND & WATER - Noon (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.79 σ

Mean = 277.47 Kelvin

Std. Dev. = σ = 1.70 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - NOON
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.79 σ
Wavelength = 9.0 - 11.4 μm
Mean = 277.47 Kelvin
σ = 1.70 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	3
10.0 TO	15.0	9
15.0 TO	20.0	7
20.0 TO	25.0	2
25.0 TO	30.0	0
30.0 TO	35.0	2
35.0 TO	40.0	2
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	3
75.0 TO	100.0	1
100.0 TO	150.0	0
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 31

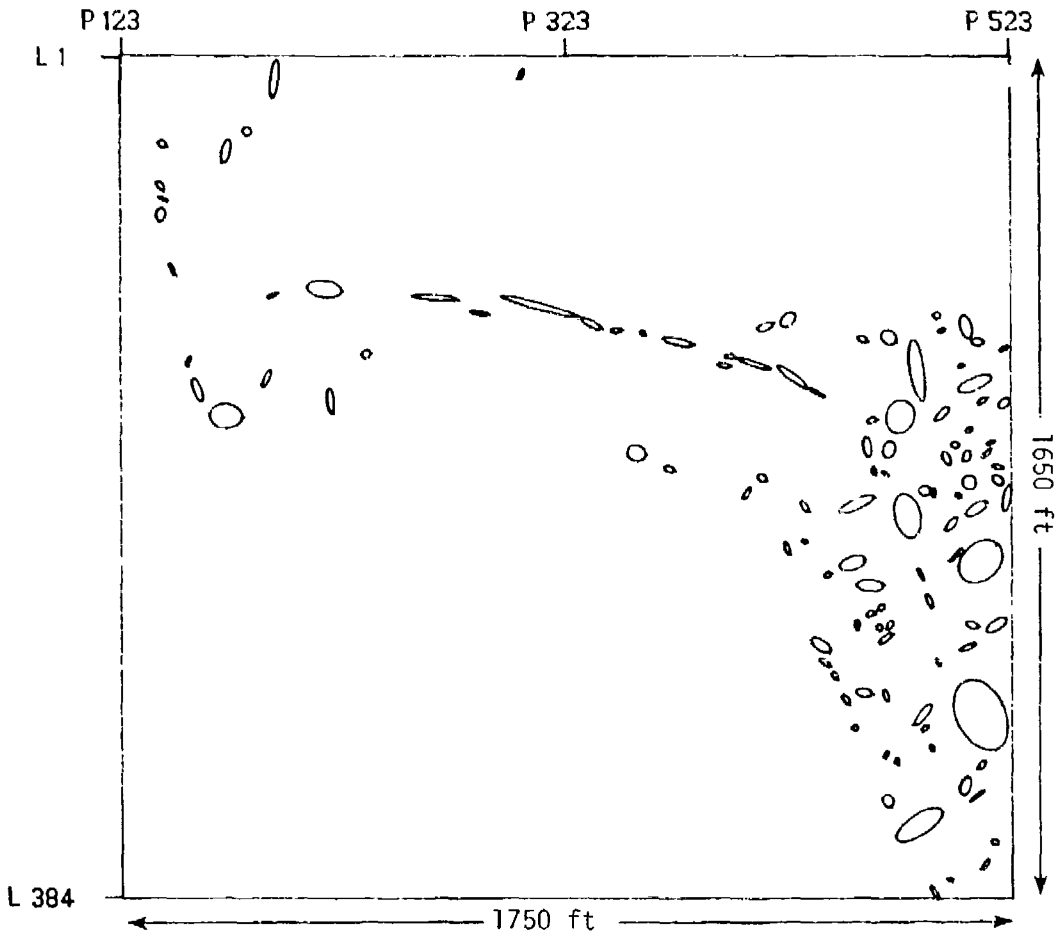
89 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	3
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	3
17 TO	20	55 TO	65	6
20 TO	22	65 TO	72	2
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	2
26 TO	28	85 TO	91	4
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	2
39 TO	45	127 TO	147	2
45 TO	55	147 TO	180	1
55 TO	71	180 TO	232	3
71 TO	100	232 TO	328	2
OVER	100	OVER	328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	5
1.3 TO 1.4	2
1.4 TO 1.5	1
1.5 TO 1.6	3
1.6 TO 1.7	7
1.7 TO 1.8	3
1.8 TO 1.9	1
1.9 TO 2.0	1
2.0 TO 2.4	3
2.4 TO 2.6	2
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	1
OVER 4.5	0



Area: LAND & WATER - Sunset (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 275.25 Kelvin

Std. Dev. = σ = 0.26 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

LAND & WATER - SUNSET
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 275.25 Kelvin
σ = 0.26 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	10
10.0	TO	15.0	22
15.0	TO	20.0	24
20.0	TO	25.0	8
25.0	TO	30.0	4
30.0	TO	35.0	4
35.0	TO	40.0	4
40.0	TO	45.0	4
45.0	TO	50.0	1
50.0	TO	75.0	16
75.0	TO	100.0	4
100.0	TO	150.0	3
150.0	TO	200.0	2
200.0	TO	250.0	2
250.0	TO	300.0	1
300.0	TO	400.0	2
400.0	TO	500.0	0
	OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 113

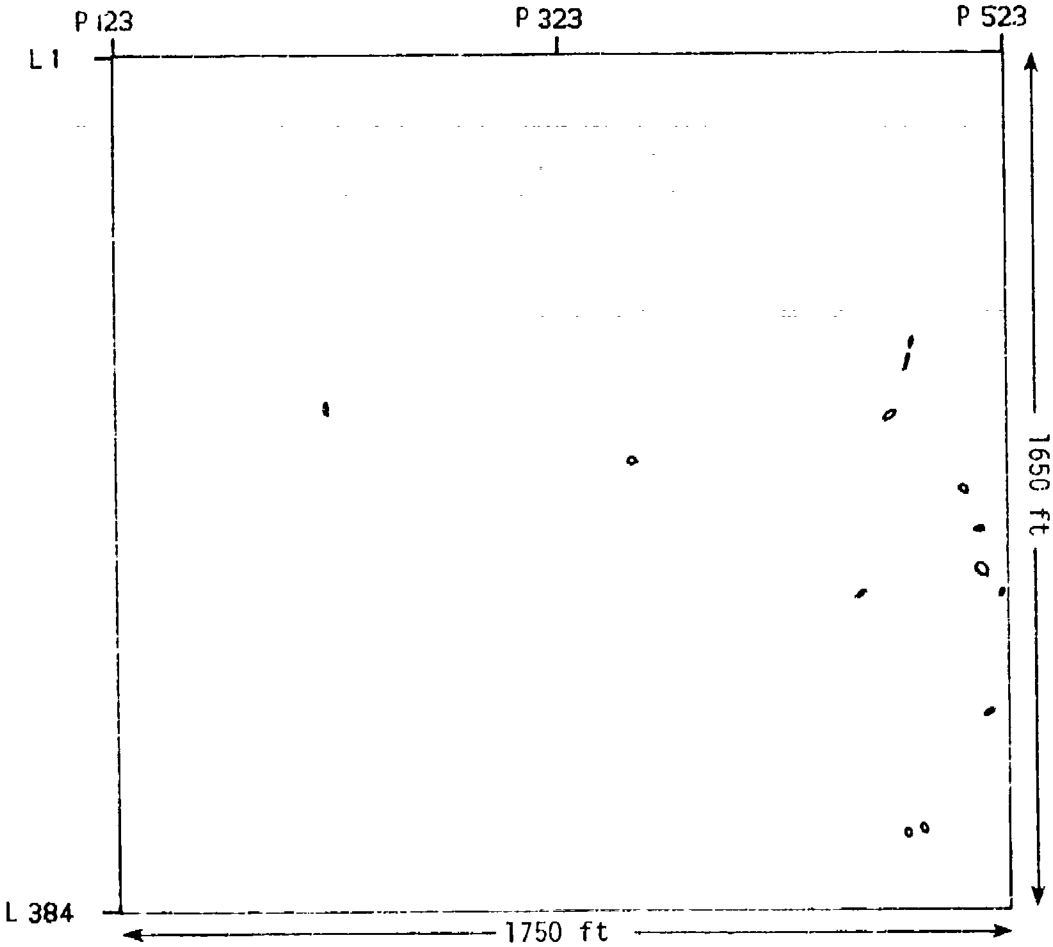
191 FEATURES WITH AREAS LESS THAN 0.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	3
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	11
17	TO	20	55	TO	65	9
20	TO	22	65	TO	72	6
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	14
26	TO	28	85	TO	91	9
28	TO	30	91	TO	98	8
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	12
39	TO	45	127	TO	147	6
45	TO	55	147	TO	180	7
55	TO	71	180	TO	232	11
71	TO	100	232	TO	328	9
OVER		100	OVER		328	8

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	6
1.3	TO	1.4	10
1.4	TO	1.5	3
1.5	TO	1.6	15
1.6	TO	1.7	11
1.7	TO	1.8	14
1.8	TO	1.9	10
1.9	TO	2.0	7
2.0	TO	2.4	15
2.4	TO	2.6	9
2.6	TO	2.8	2
2.8	TO	3.0	3
3.0	TO	3.5	3
3.5	TO	4.0	2
4.0	TO	4.5	0
	OVER	4.5	3



Area: LAND & WATER - Sunset (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.50 σ

Mean = 275.25 Kelvin

Std. Dev. = σ = 0.26 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 275.25 Kelvin

σ = 0.26 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	3
10.0 TO	15.0	5
15.0 TO	20.0	3
20.0 TO	25.0	1
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 13

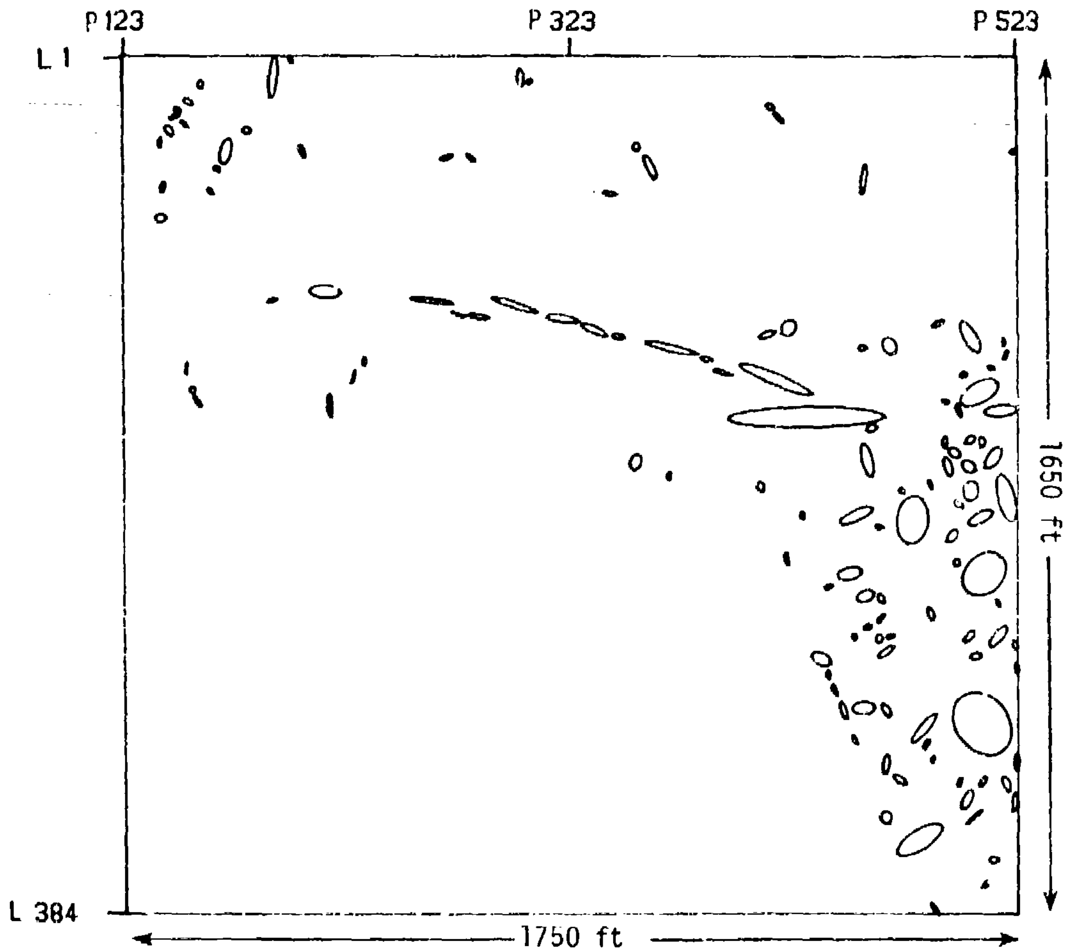
31 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	1
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	3
17 TO 20	55 TO 65	5
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	5
1.3 TO 1.4	1
1.4 TO 1.5	0
1.5 TO 1.6	2
1.6 TO 1.7	1
1.7 TO 1.8	0
1.8 TO 1.9	3
1.9 TO 2.0	0
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Sunset (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.76 σ

Mean = 275.12 Kelvin

Std. Dev. = σ = 0.43 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.76 σ

Wavelength = 9.0 - 11.4 μm

Mean = 275.12 Kelvin

σ = 0.43 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	21
10.0	TO	15.0	27
15.0	TO	20.0	22
20.0	TO	25.0	8
25.0	TO	30.0	6
30.0	TO	35.0	7
35.0	TO	40.0	2
40.0	TO	45.0	1
45.0	TO	50.0	3
50.0	TO	75.0	9
75.0	TO	100.0	10
100.0	TO	150.0	5
150.0	TO	200.0	0
200.0	TO	250.0	2
250.0	TO	300.0	2
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 129

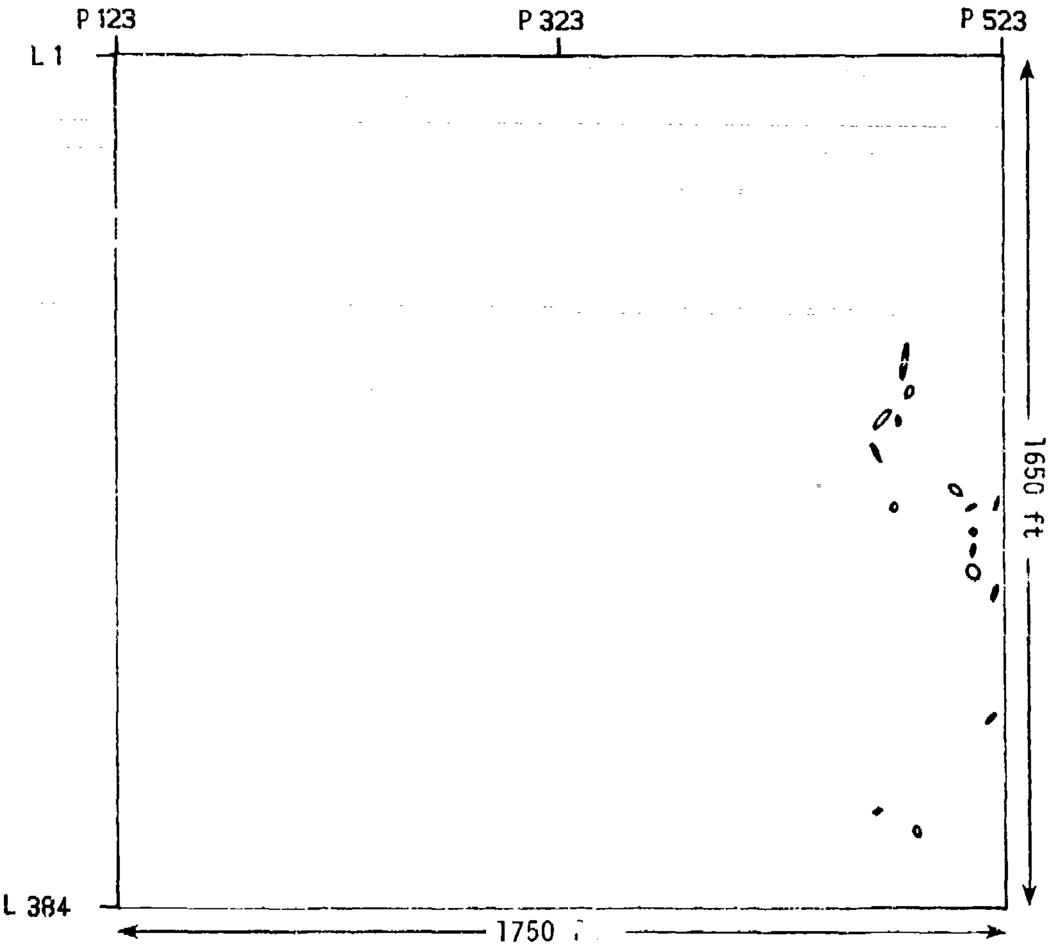
192 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	8
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	17
17 TO 20	55 TO 65	17
20 TO 22	65 TO 72	12
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	13
26 TO 28	85 TO 91	3
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	20
39 TO 45	127 TO 147	4
45 TO 55	147 TO 180	6
55 TO 71	180 TO 232	6
71 TO 100	232 TO 328	12
OVER 100	OVER 328	10

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	10
1.3 TO 1.4	9
1.4 TO 1.5	12
1.5 TO 1.6	23
1.6 TO 1.7	15
1.7 TO 1.8	11
1.8 TO 1.9	8
1.9 TO 2.0	6
2.0 TO 2.4	15
2.4 TO 2.6	5
2.6 TO 2.8	6
2.8 TO 3.0	1
3.0 TO 3.5	1
3.5 TO 4.0	1
4.0 TO 4.5	1
OVER 4.5	4



Area: LAND & WATER - Sunset (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 275.12 Kelvin

Std. Dev. = σ = 0.43 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - SUNSET

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 9.0 - 11.5 μm

Mean = 275.12 Kelvin

σ = 0.43 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	2
10.0 TO	15.0	5
15.0 TO	20.0	4
20.0 TO	25.0	1
25.0 TO	30.0	1
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	1
45.0 TO	50.0	1
50.0 TO	75.0	1
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 16

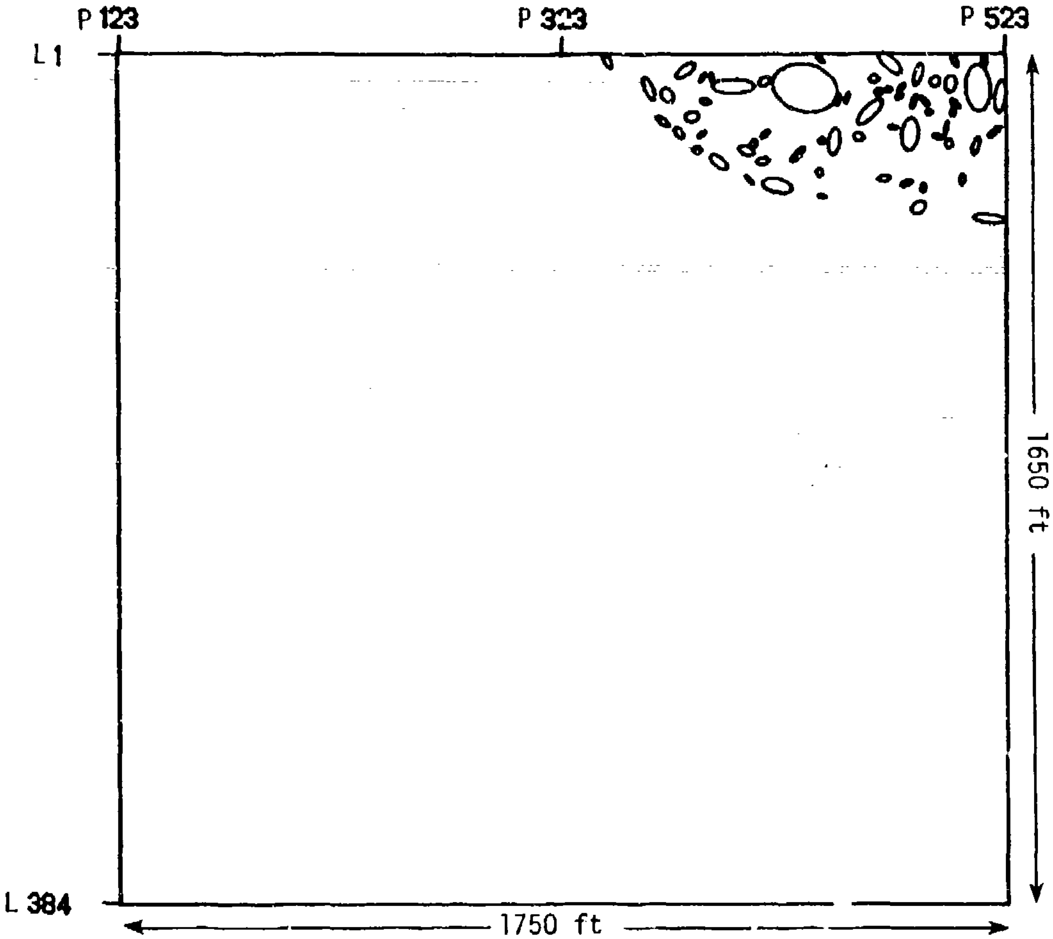
29 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	3
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	2
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	2
1.3 TO 1.4	2
1.4 TO 1.5	1
1.5 TO 1.6	1
1.6 TO 1.7	1
1.7 TO 1.8	3
1.8 TO 1.9	1
1.9 TO 2.0	1
2.0 TO 2.4	3
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Midnight (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 274.96 Kelvin

Std. Dev. = σ = 0.07 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 274.96 Kelvin

σ = 0.07 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	9
10.0 TO	15.0	11
15.0 TO	20.0	12
20.0 TO	25.0	8
25.0 TO	30.0	2
30.0 TO	35.0	2
35.0 TO	40.0	2
40.0 TO	45.0	0
45.0 TO	50.0	2
50.0 TO	75.0	5
75.0 TO	100.0	4
100.0 TO	150.0	2
150.0 TO	200.0	2
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 63

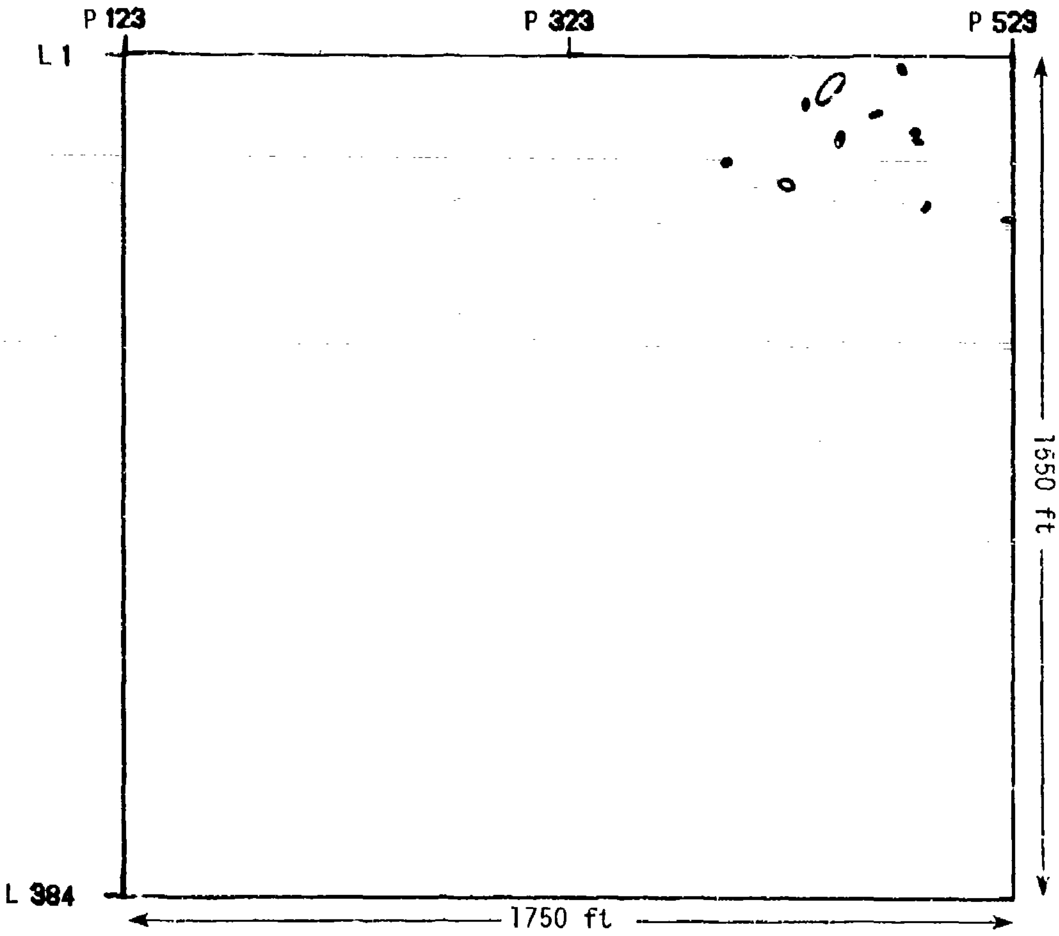
238 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	3
17 TO	20	55 TO	65	10
20 TO	22	65 TO	72	4
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	5
26 TO	28	85 TO	91	3
28 TO	30	91 TO	98	3
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	7
39 TO	45	127 TO	147	3
45 TO	55	147 TO	180	9
55 TO	71	180 TO	232	5
71 TO	100	232 TO	328	4
OVER	100	OVER	328	7

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	3
1.4 TO 1.5	1
1.5 TO 1.6	5
1.6 TO 1.7	5
1.7 TO 1.8	7
1.8 TO 1.9	3
1.9 TO 2.0	1
2.0 TO 2.4	18
2.4 TO 2.6	5
2.6 TO 2.8	1
2.8 TO 3.0	3
3.0 TO 3.5	6
3.5 TO 4.0	2
4.0 TO 4.5	0
OVER 4.5	3



Area: LAND & WATER - Midnight (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 4.87 σ

Mean = 274.96 Kelvin

Std. Dev. = σ = 0.07 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 4.87 σ

Wavelength = 4.5 - 5.5 μm

Mean = 274.96 Kelvin

σ = 0.07 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	1
10.0 TO	15.0	5
15.0 TO	20.0	2
20.0 TO	25.0	1
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	1
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 11

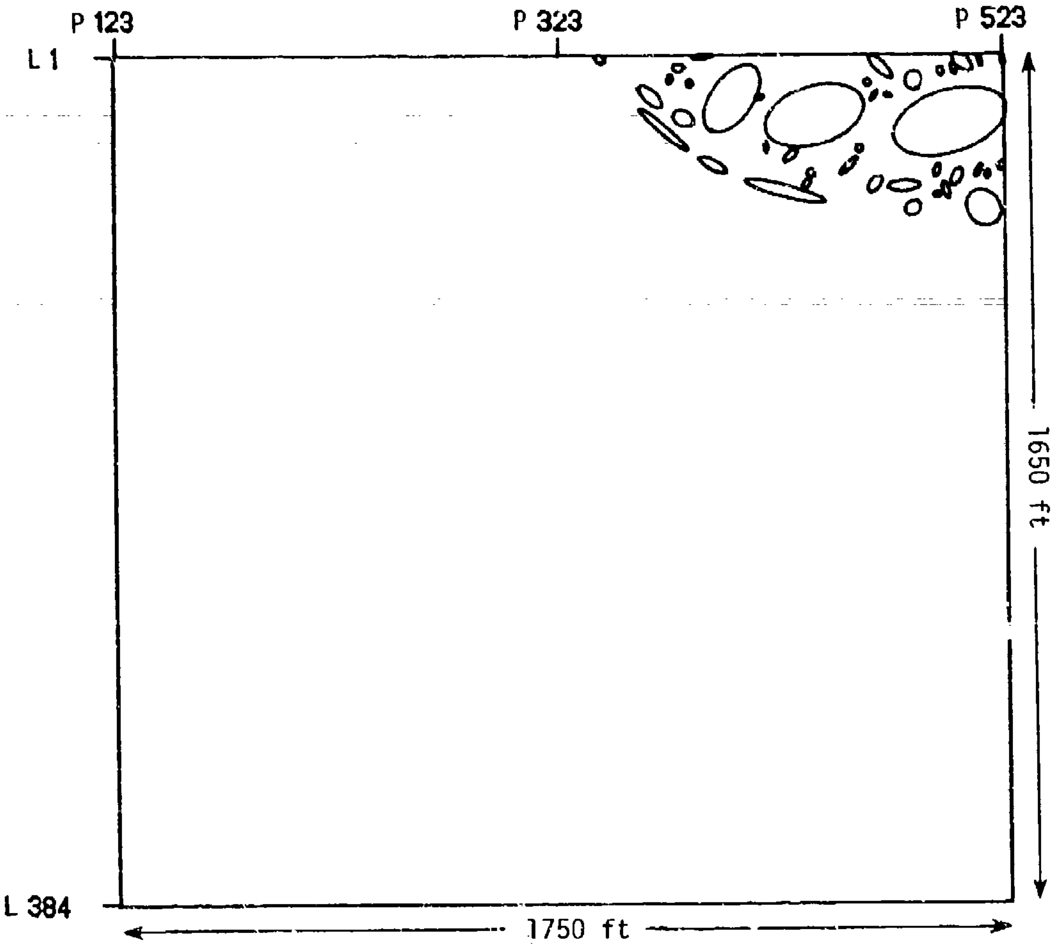
53 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	1
20 TO 22	65 TO 72	2
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	4
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	1
1.3 TO 1.4	0
1.4 TO 1.5	2
1.5 TO 1.6	0
1.6 TO 1.7	1
1.7 TO 1.8	1
1.8 TO 1.9	1
1.9 TO 2.0	1
2.0 TO 2.4	3
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	1
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: LAND & WATER - Midnight (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 274.74 Kelvin

Std. Dev. = σ = 0.11 Kelvin

EQUIVALENT ELLIPTICAL AREAS

ERIM

LAND & WATER - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 9.0 - 11.4 μm
Mean = 274.74 Kelvin
σ = 0.11 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	1
10.0 TO	15.0	11
15.0 TO	20.0	6
20.0 TO	25.0	2
25.0 TO	30.0	3
30.0 TO	35.0	1
35.0 TO	40.0	0
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	4
75.0 TO	100.0	5
100.0 TO	150.0	2
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	1
300.0 TO	400.0	1
400.0 TO	500.0	0
OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 41

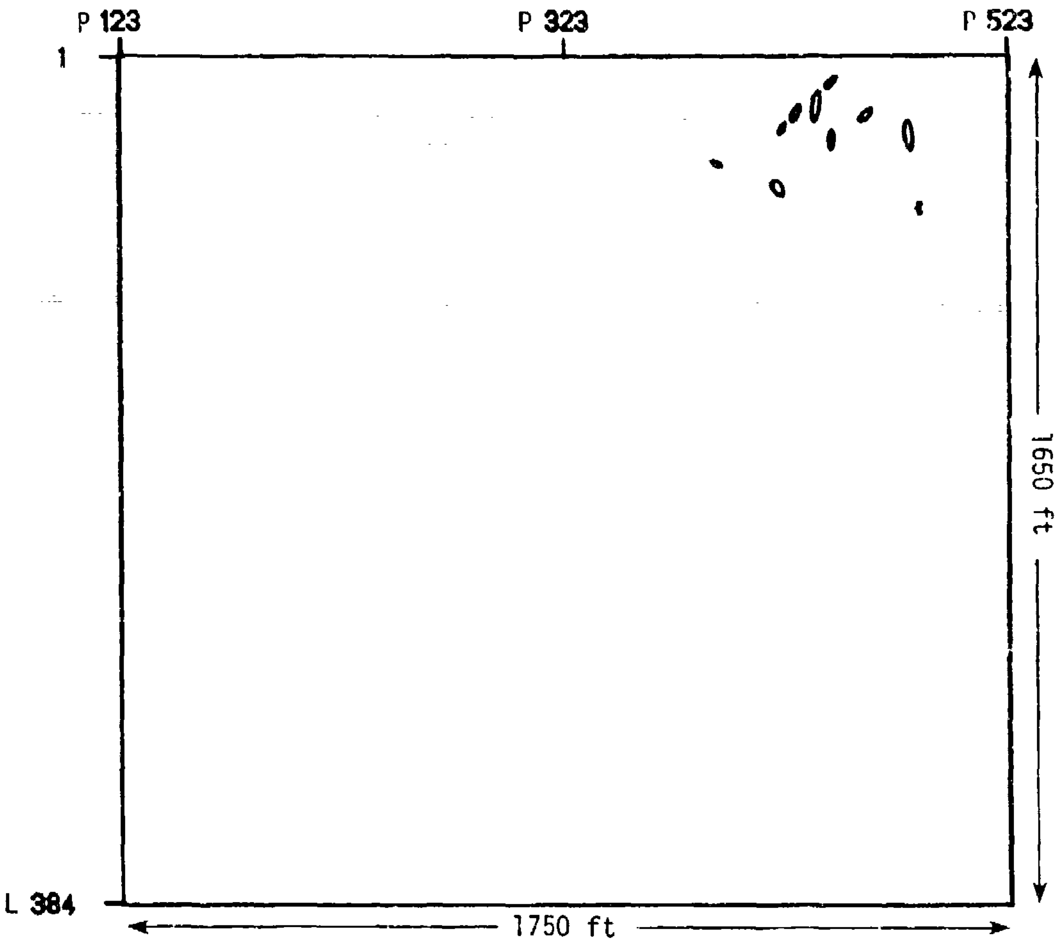
99 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	2
17 TO	20	55 TO	65	5
20 TO	22	65 TO	72	6
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	1
28 TO	30	91 TO	98	3
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	3
39 TO	45	127 TO	147	4
45 TO	55	147 TO	180	1
55 TO	71	180 TO	232	4
71 TO	100	232 TO	328	3
OVER	100	OVER	328	8

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	1
1.3 TO 1.4	1
1.4 TO 1.5	3
1.5 TO 1.6	3
1.6 TO 1.7	3
1.7 TO 1.8	2
1.8 TO 1.9	3
1.9 TO 2.0	2
2.0 TO 2.4	9
2.4 TO 2.6	3
2.6 TO 2.8	2
2.8 TO 3.0	0
3.0 TO 3.5	2
3.5 TO 4.0	2
4.0 TO 4.5	0
OVER 4.5	4



Area: LAND & WATER - Midnight (Wavelength = 9.0 -11.4 μm)

Temperature Threshold = Mean + 5.15 σ

Mean = 274.74 Kelvin

Std. Dev. = σ = 0.11 Kelvin

EQUIVALENT ELLIPTICAL AREAS

LAND & WATER - MIDNIGHT

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 5.15 σ

Wavelength = 9.0 - 11.4 μm

Mean = 274.74 Kelvin

σ = 0.11 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	0
10.0	TO	15.0	3
15.0	TO	20.0	0
20.0	TO	25.0	1
25.0	TO	30.0	2
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 10

19 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	2
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	1
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	1
OVER		100	OVER		328	0

BY SHAPE

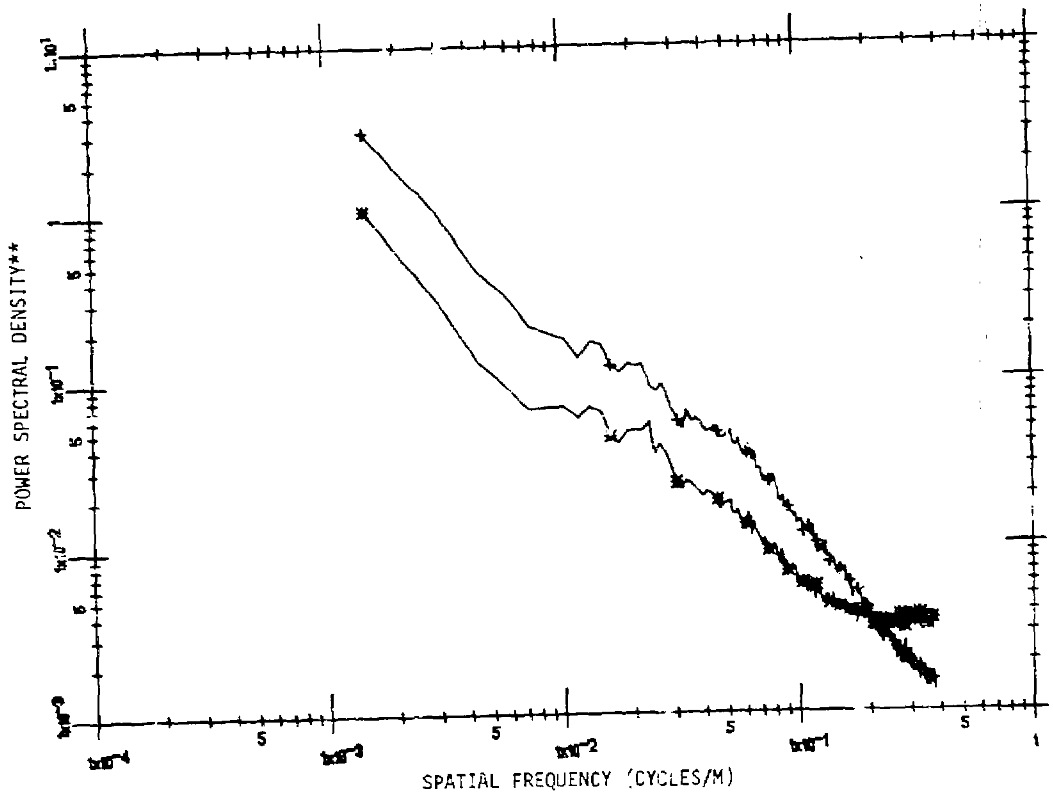
SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	0
1.3	TO	1.4	0
1.4	TO	1.5	2
1.5	TO	1.6	2
1.6	TO	1.7	1
1.7	TO	1.8	0
1.8	TO	1.9	2
1.9	TO	2.0	0
2.0	TO	2.4	2
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
OVER		4.5	0

ERIM

MICHIGAN WINTER SCENE - LAND & WATER

Power Spectra

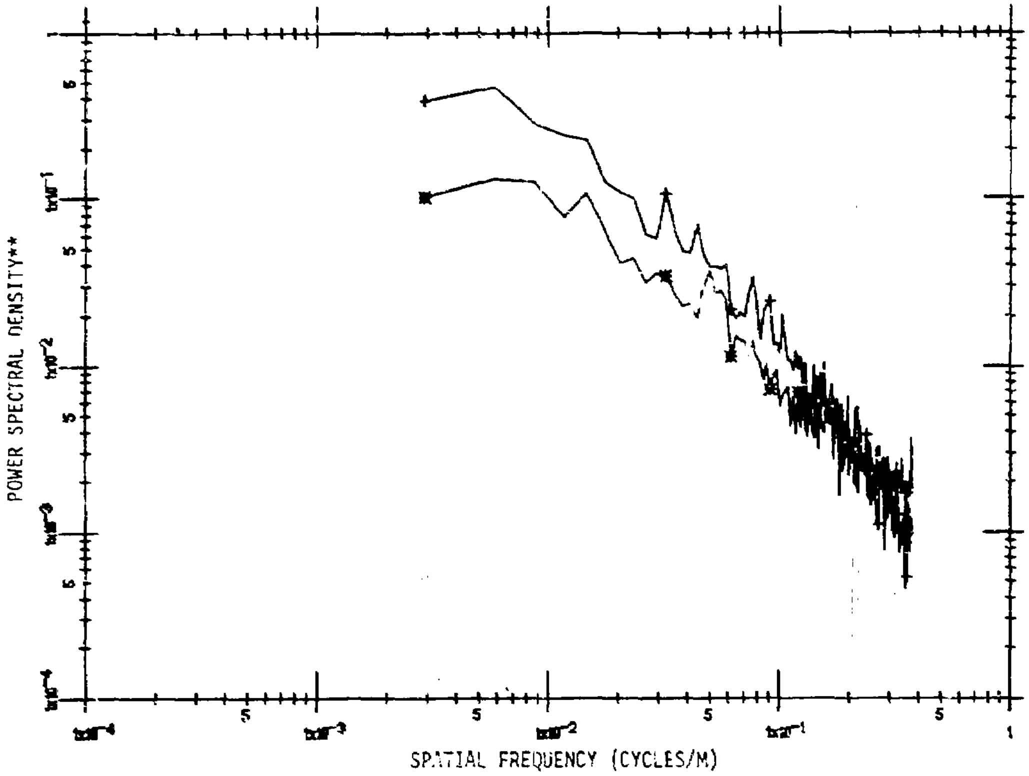
Spectral Bands: 3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - CROSS-TRACK

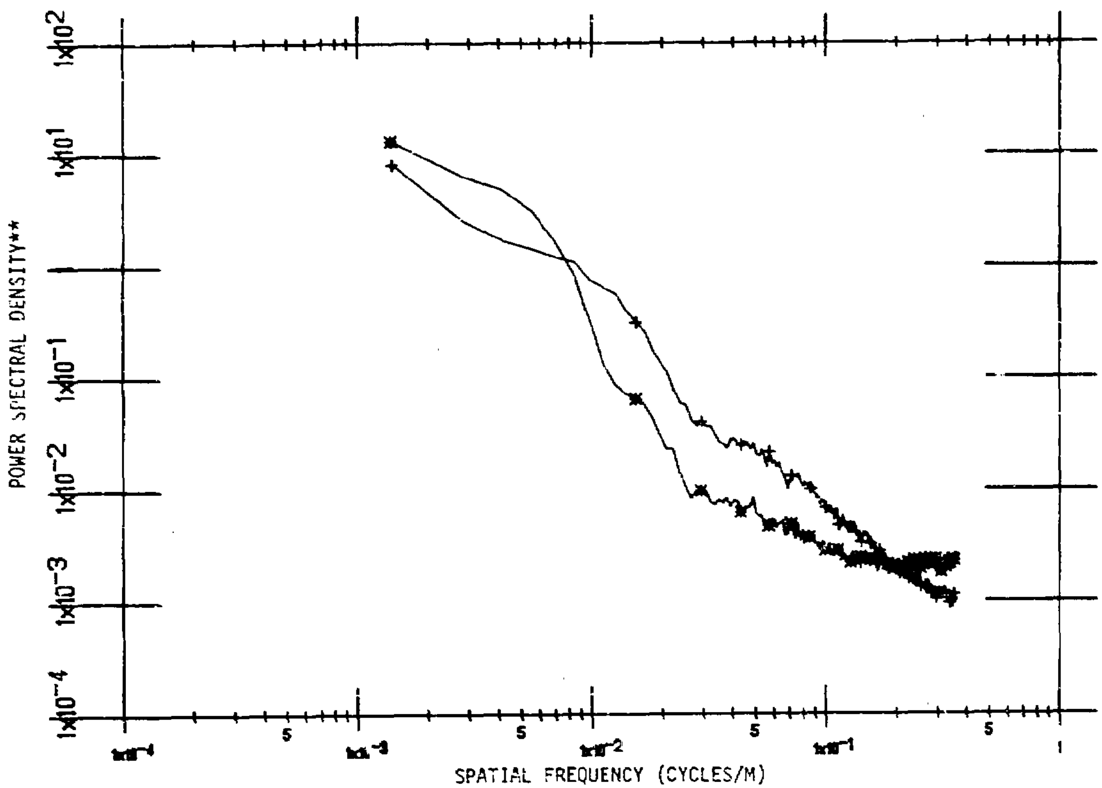
** Power Spectral Density is (°K)^2/cycles/meter for 4.5 to 5.5 um and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 90 DEG.) - IN-TRACK

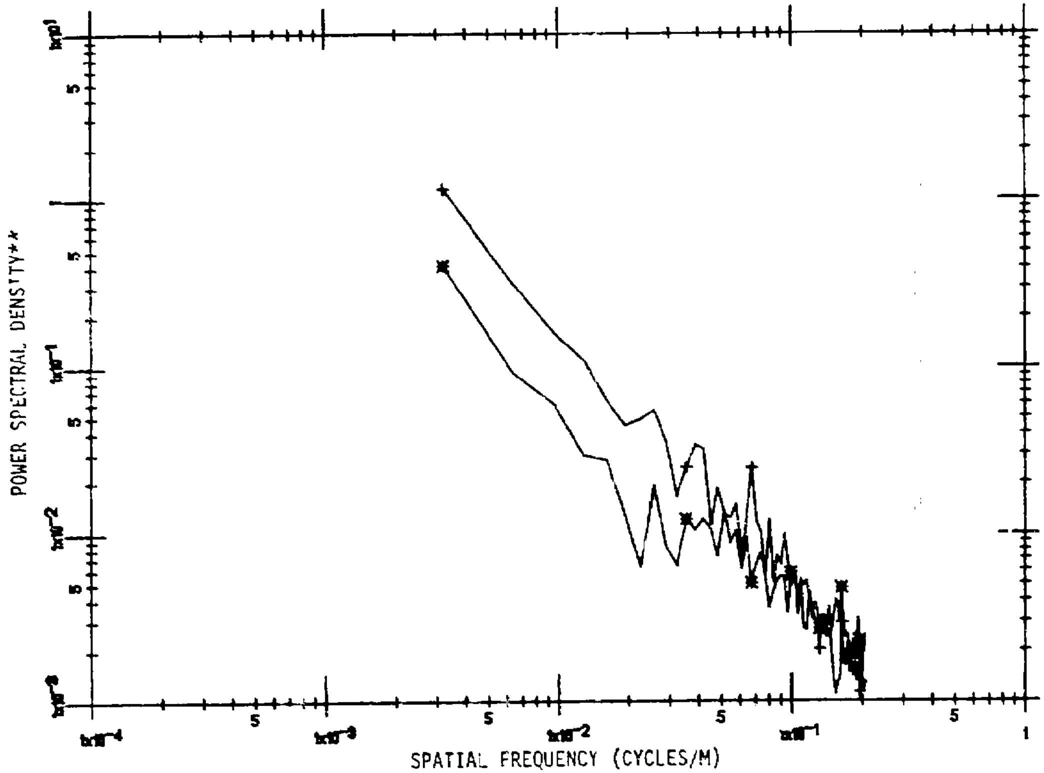
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - CROSS-TRACK

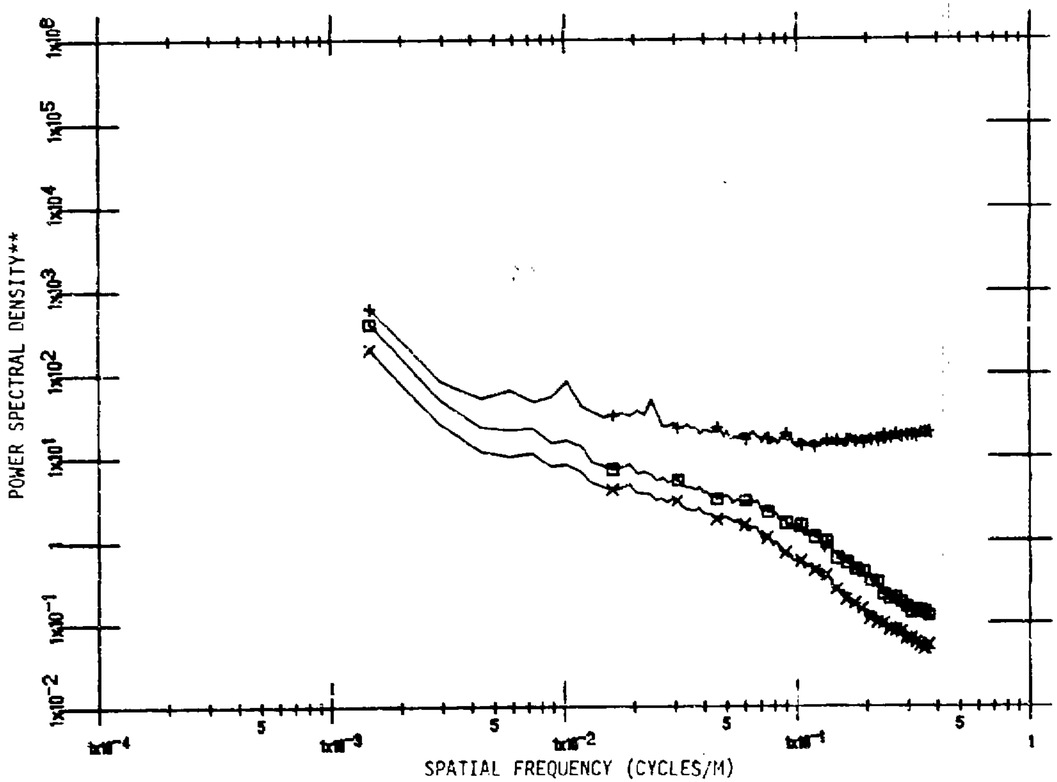
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 µm and 9.0 to 11.4 µm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: PRE-DAWN - (ANGLE: 35 DEG.) - IN-TRACK

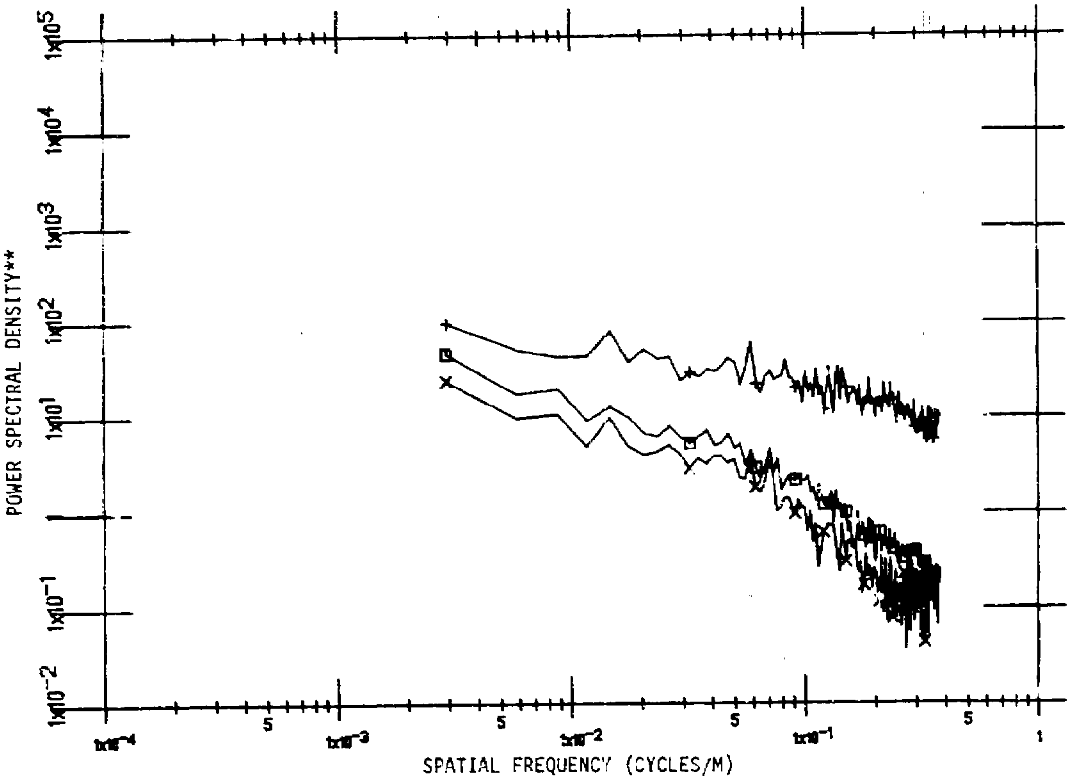
**Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - CROSS-TRACK

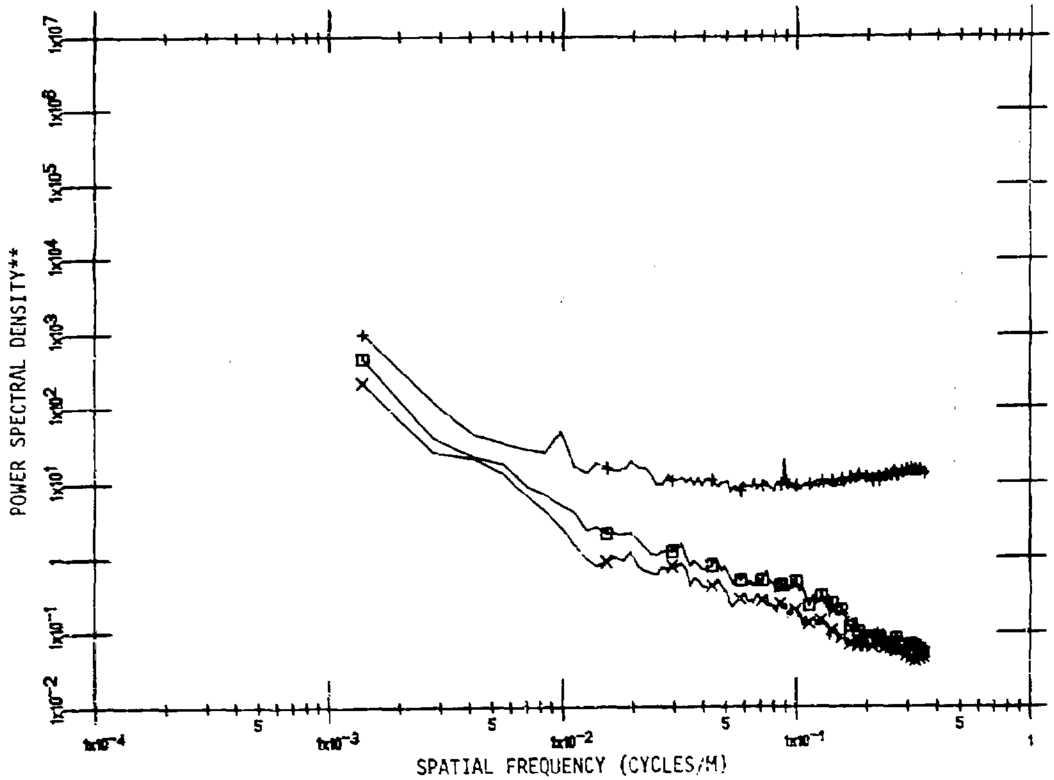
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 90 DEG.) - IN-TRACK

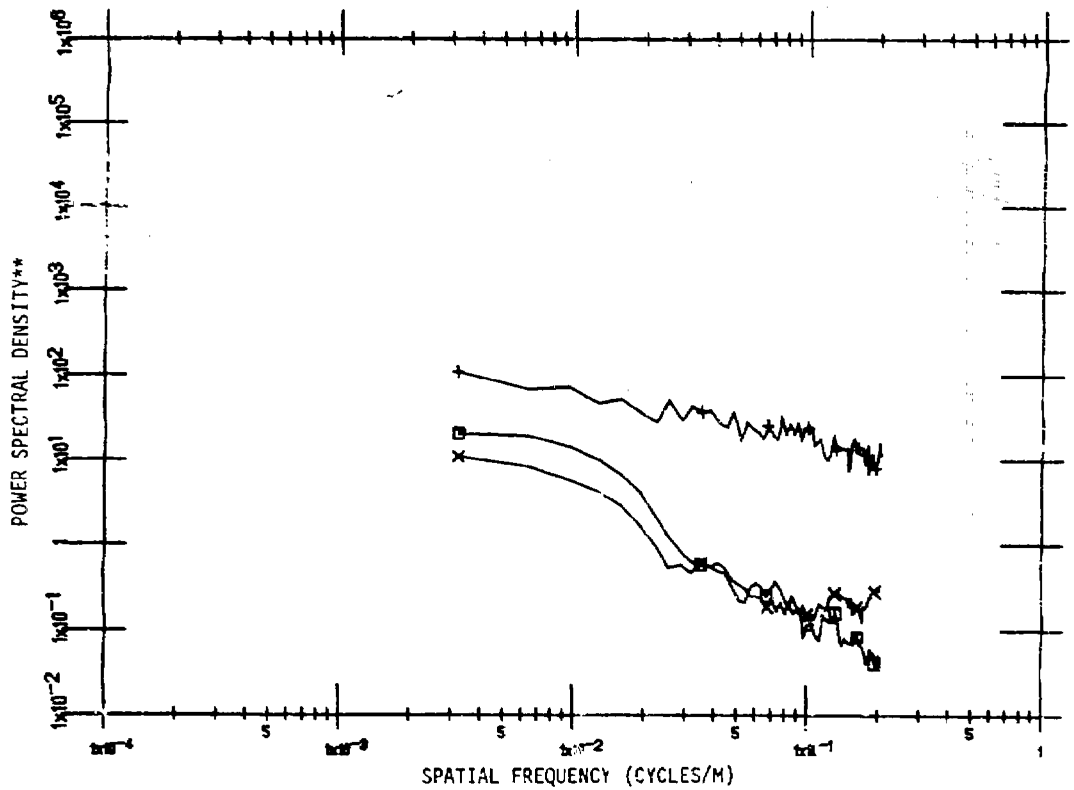
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 3.5-3.9 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - CROSS-TRACK

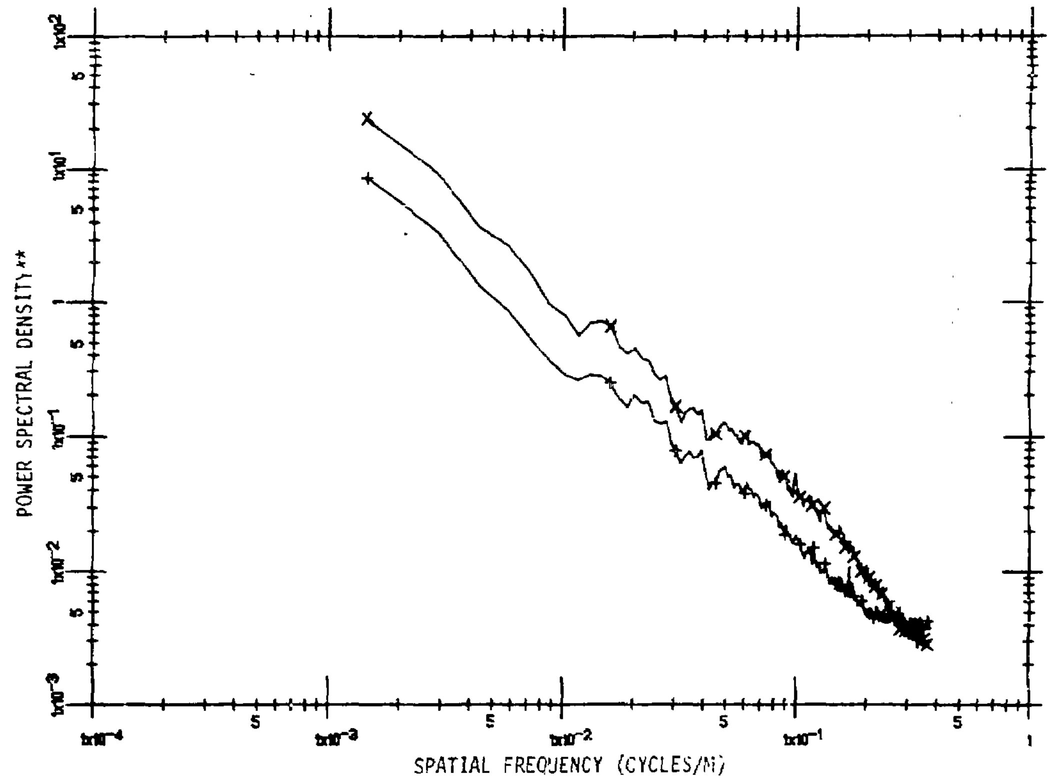
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 3.5-3.9 (+), 4.5-5.5 (x), 9.0-11.4 (⊡)

POWER SPECTRA - MICHIGAN WINTER SCENE: NOON - (ANGLE: 35 DEG.) - IN-TRACK

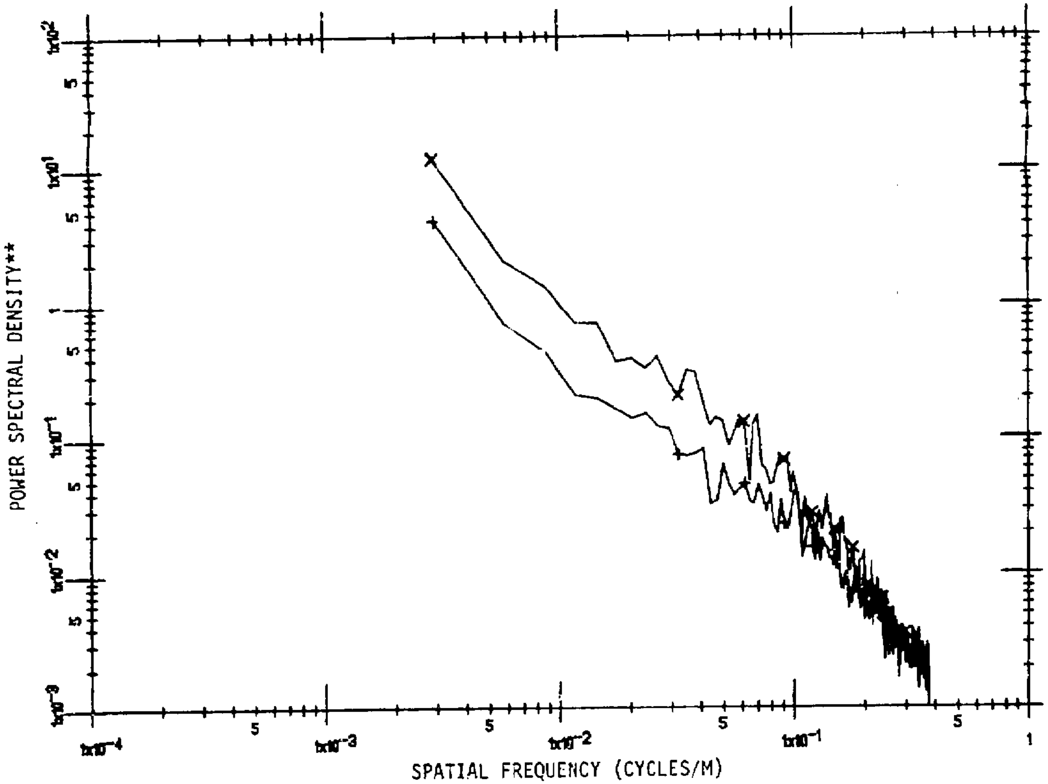
** Power Spectral Density is $(°K)^2$/cycle/meter for 3.5 to 3.9 μm, 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - CROSS-TRACK

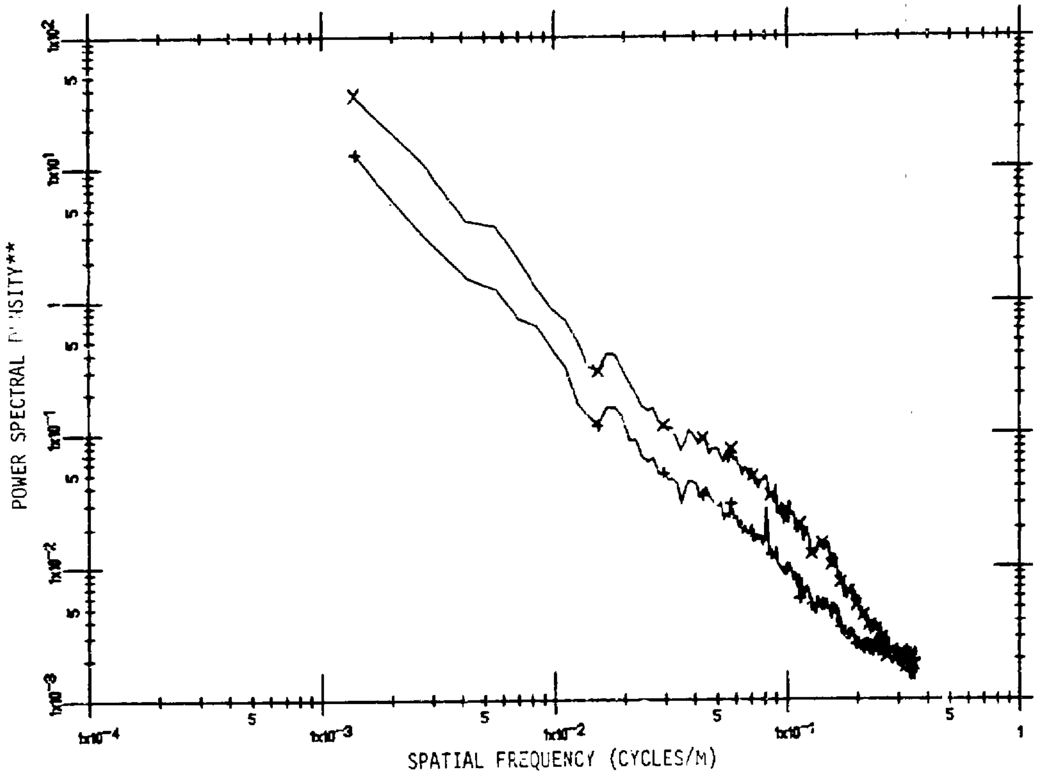
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 90 DEG.) - IN-TRACK

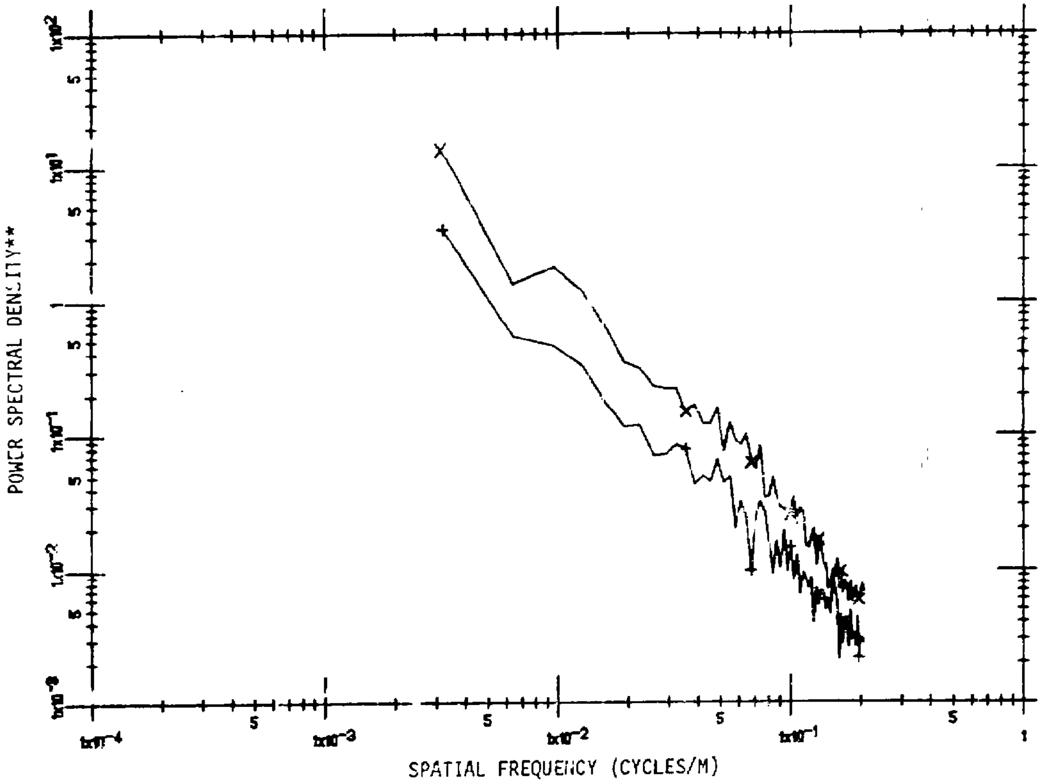
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - CROSS-TRACK

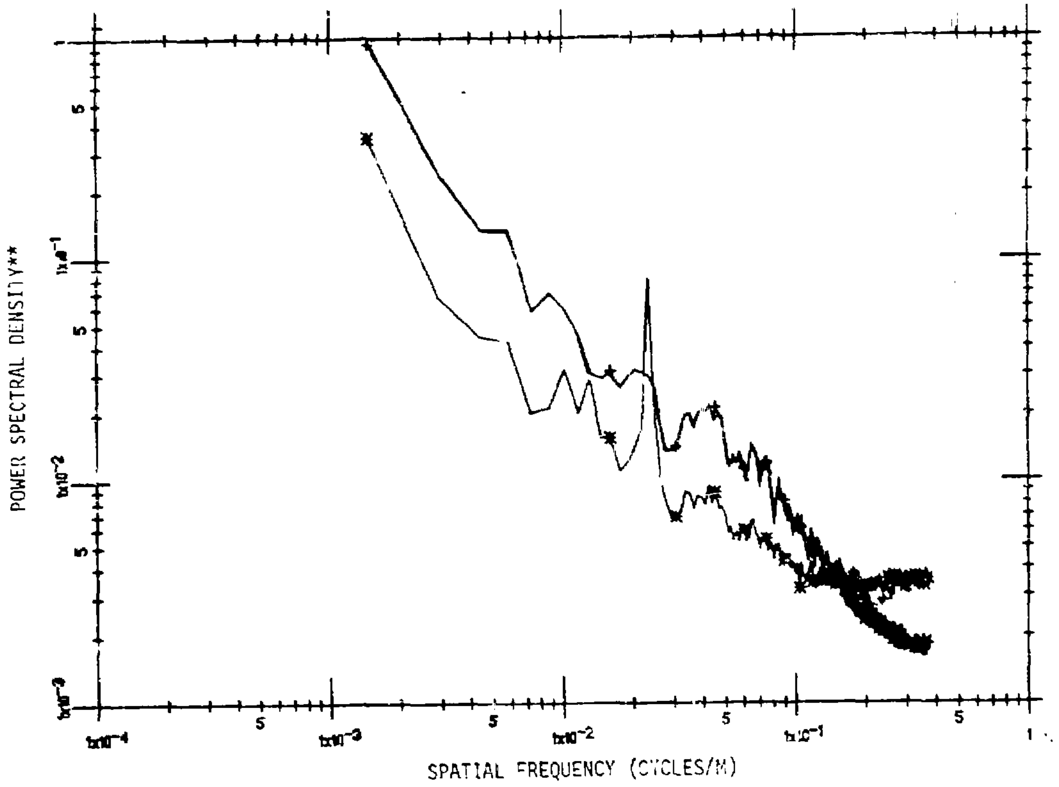
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (+), 9.0-11.4 (X)

POWER SPECTRA - MICHIGAN WINTER SCENE: SUNSET - (ANGLE: 35 DEG.) - IN-TRACK

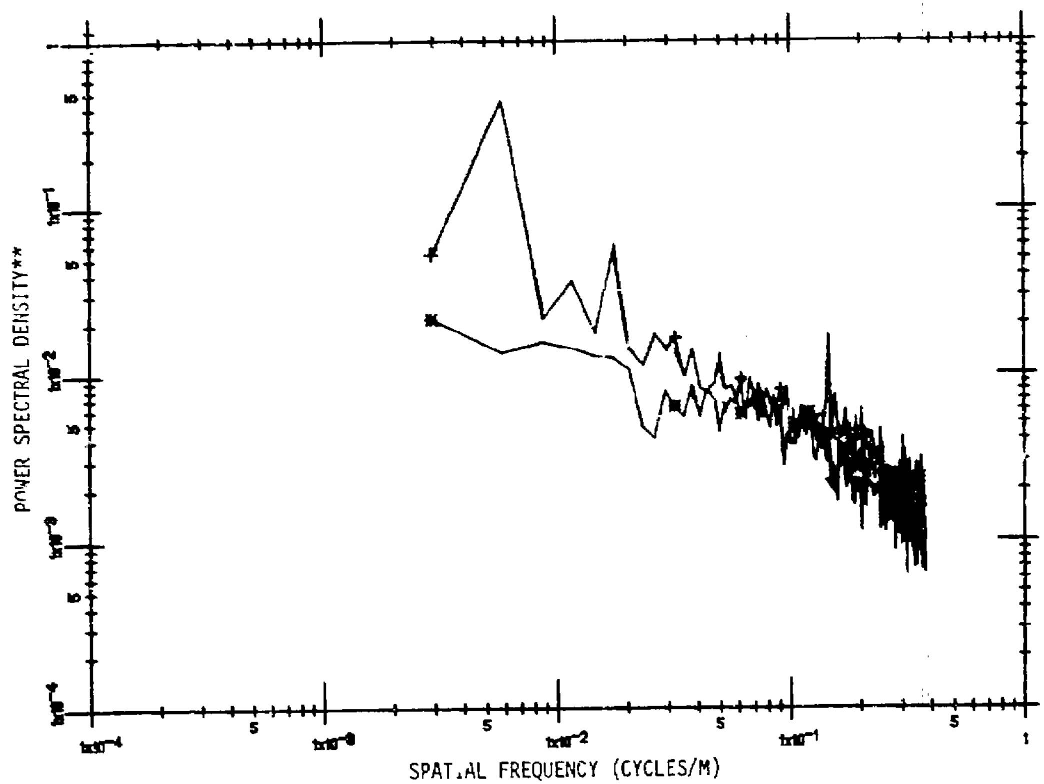
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - CROSS-TRACK

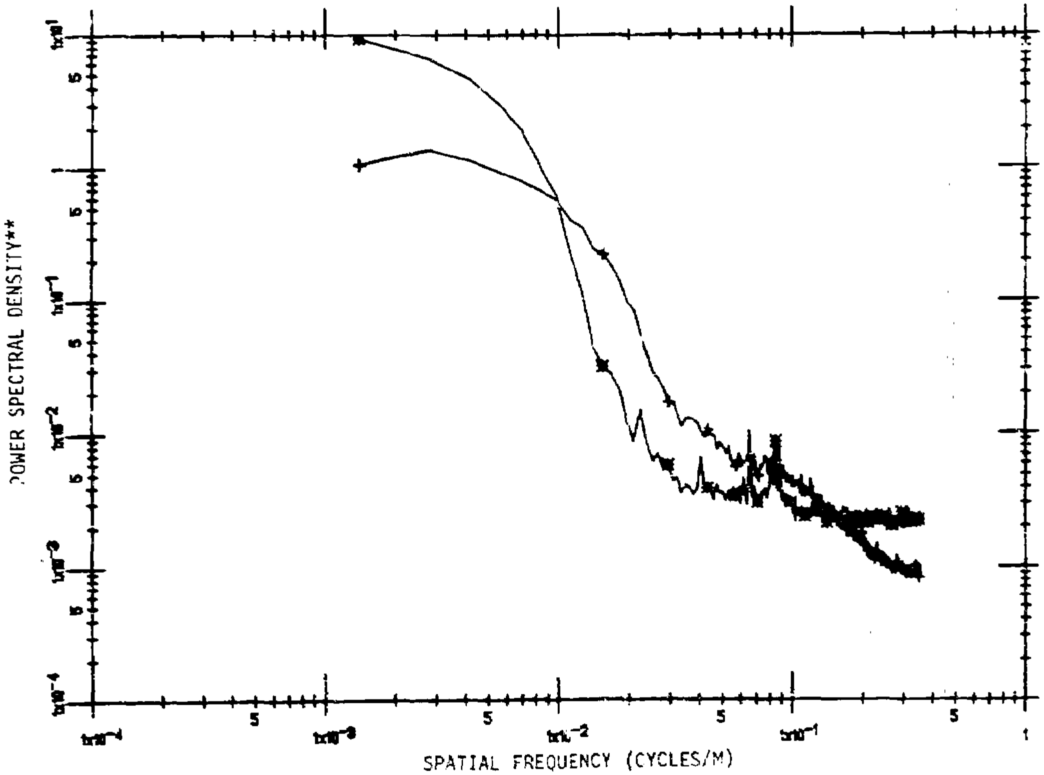
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 90 DEG.) - IN-TRACK

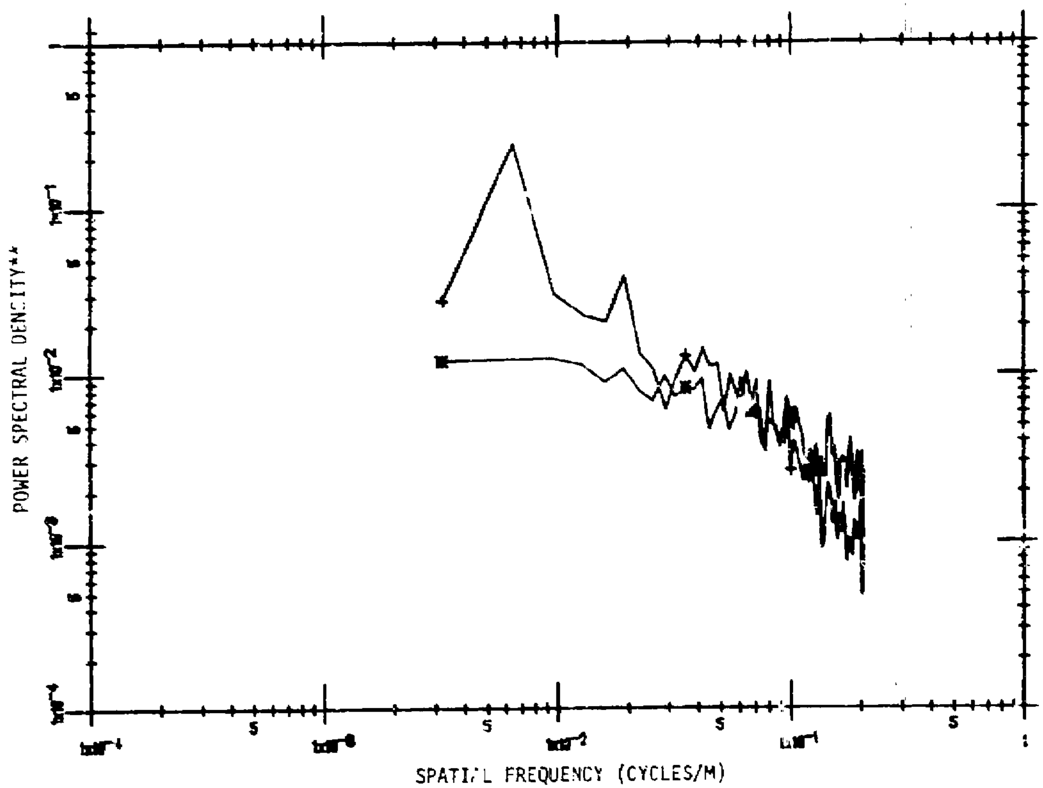
** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - CROSS-TRACK

** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.



Area: LAND & WATER Wavelength = 4.5-5.5 (*), 9.0-11.4 (+)

POWER SPECTRA - MICHIGAN WINTER SCENE: MIDNIGHT - (ANGLE: 35 DEG.) - IN-TRACK

** Power Spectral Density is $(°K)^2$/cycle/meter for 4.5 to 5.5 μm and 9.0 to 11.4 μm bands.

MILL CREEK, OKLAHOMA*

Pertinent Scene and Flight Information

(Date of Flight: 30 June 1972)

*For specific discussions of these and associated data for this scenery, refer to Reference 1.

MILL CREEK Data

Wavelength Bands:

1.0-1.4 µm, 1.5-1.8 µm, 2.0-2.6 µm, 9.3-11.7 µm

IFOV: 2.5 mrad (cross-track); 5.0 mrad (in-track)

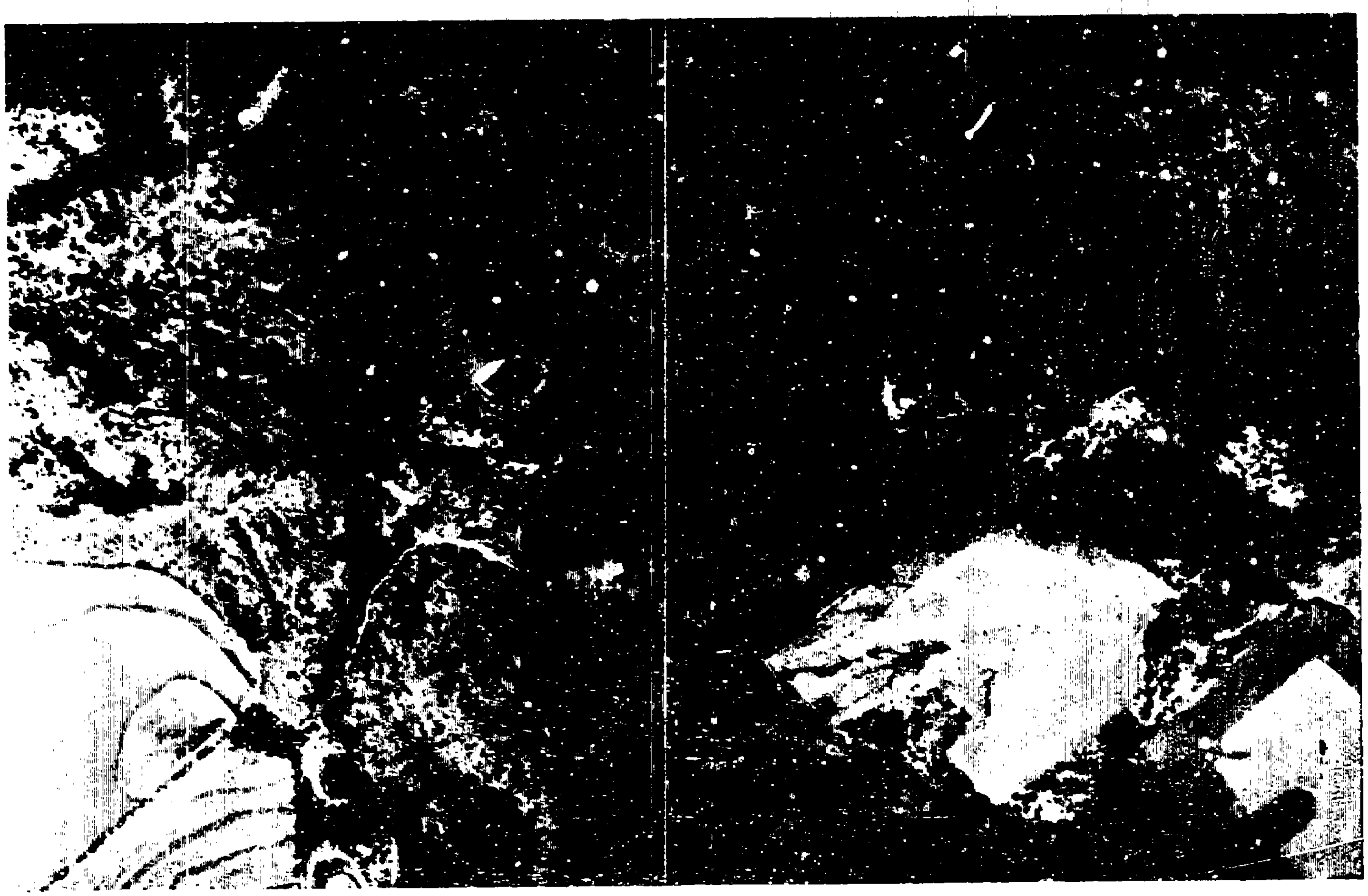
Altitude: 3000 ft Depression Angle: 90°

Time: 0730 hrs Flight Direction: Southeast

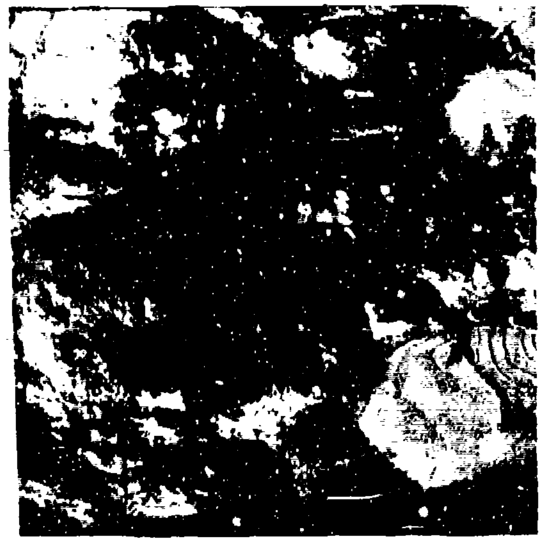
Ground Speed: ∿200 $ft\text{-}sec^{-1}$

Area Covered (Approx.): 4000 ft long x 4800 ft wide

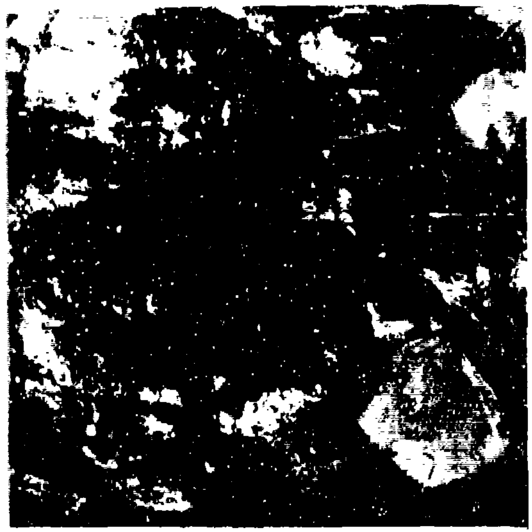
Meteorology: Visibility 30 mi; dry; cloud cover 30%



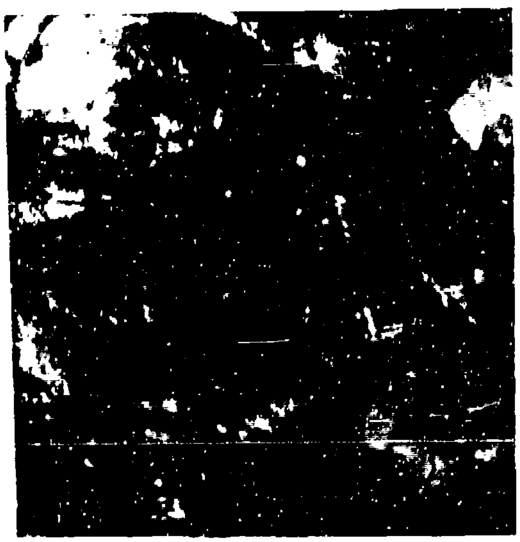
AERIAL PHOTOGRAPH - MILL CREEK



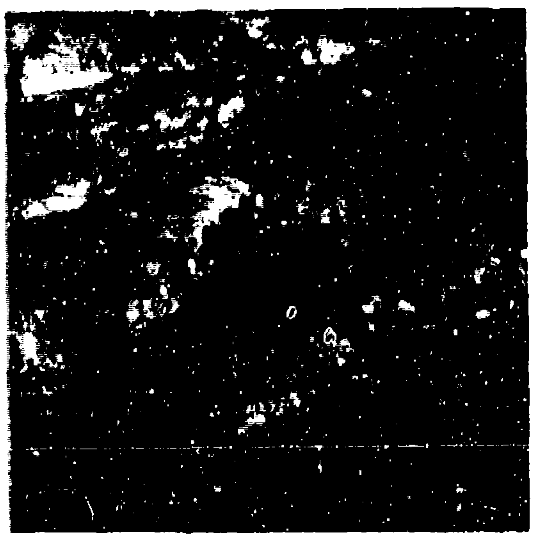
1.0 - 1.4 μm



1.5 - 1.8 μm



2.0 - 2.6 μm



9.3 - 11.7 μm

LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF MILL CREEK

GREYMAP OF MILL CREEK

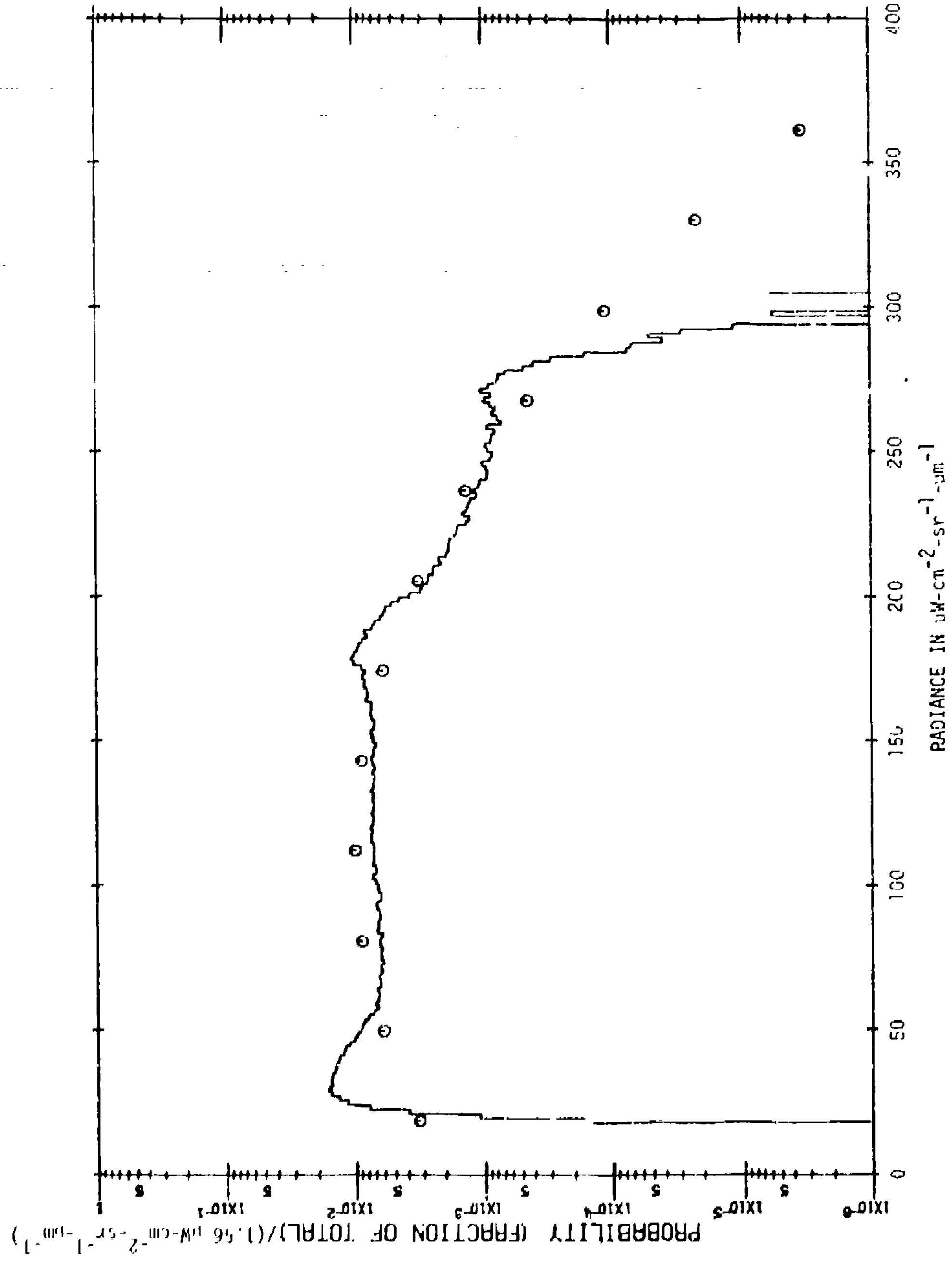
*(Note: Line range of analyzed scene was 1-330; not completely shown here.)

MILL CREEK, OKLAHOMA

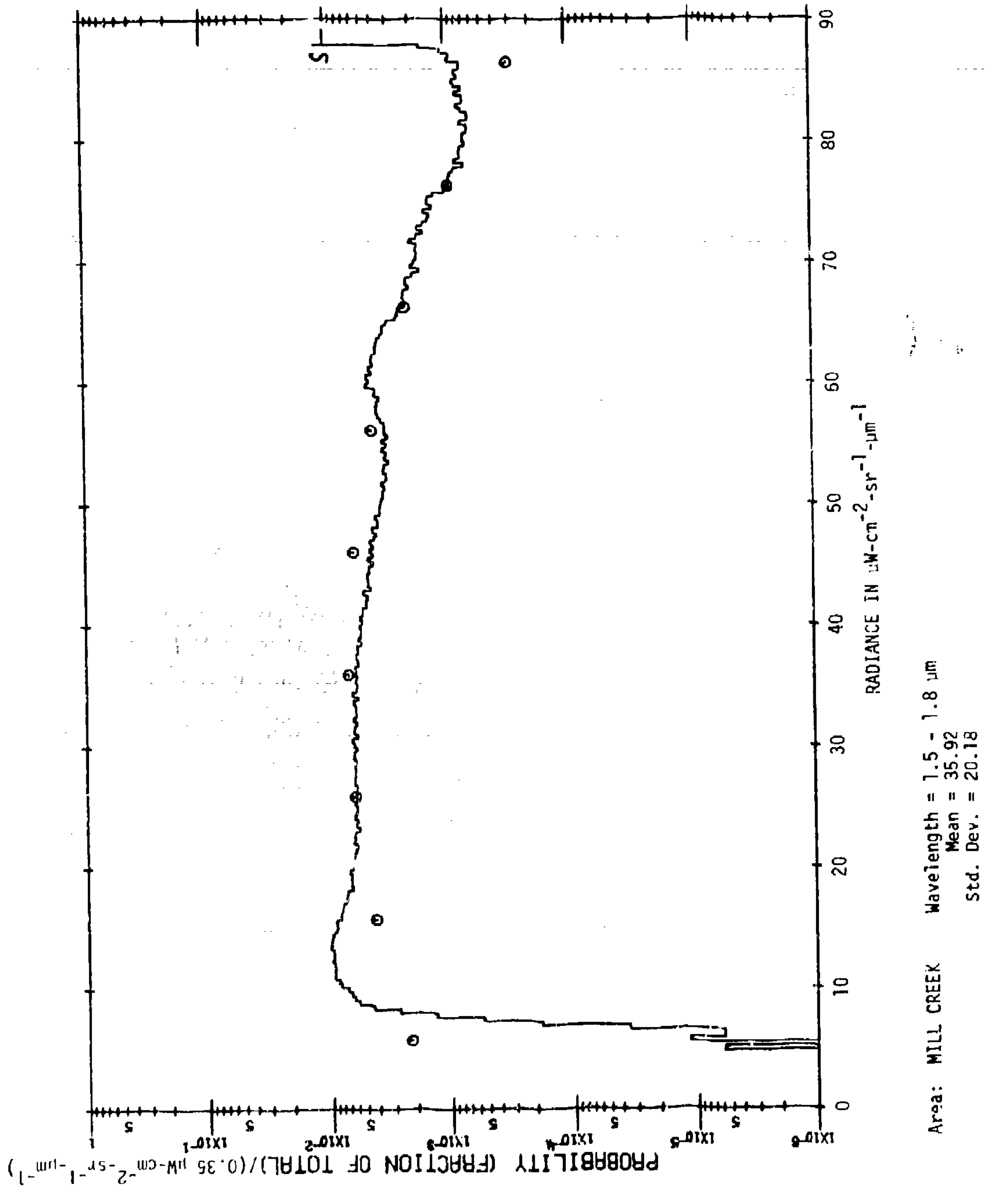
Histograms*

Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
9.3 - 11.7 μm

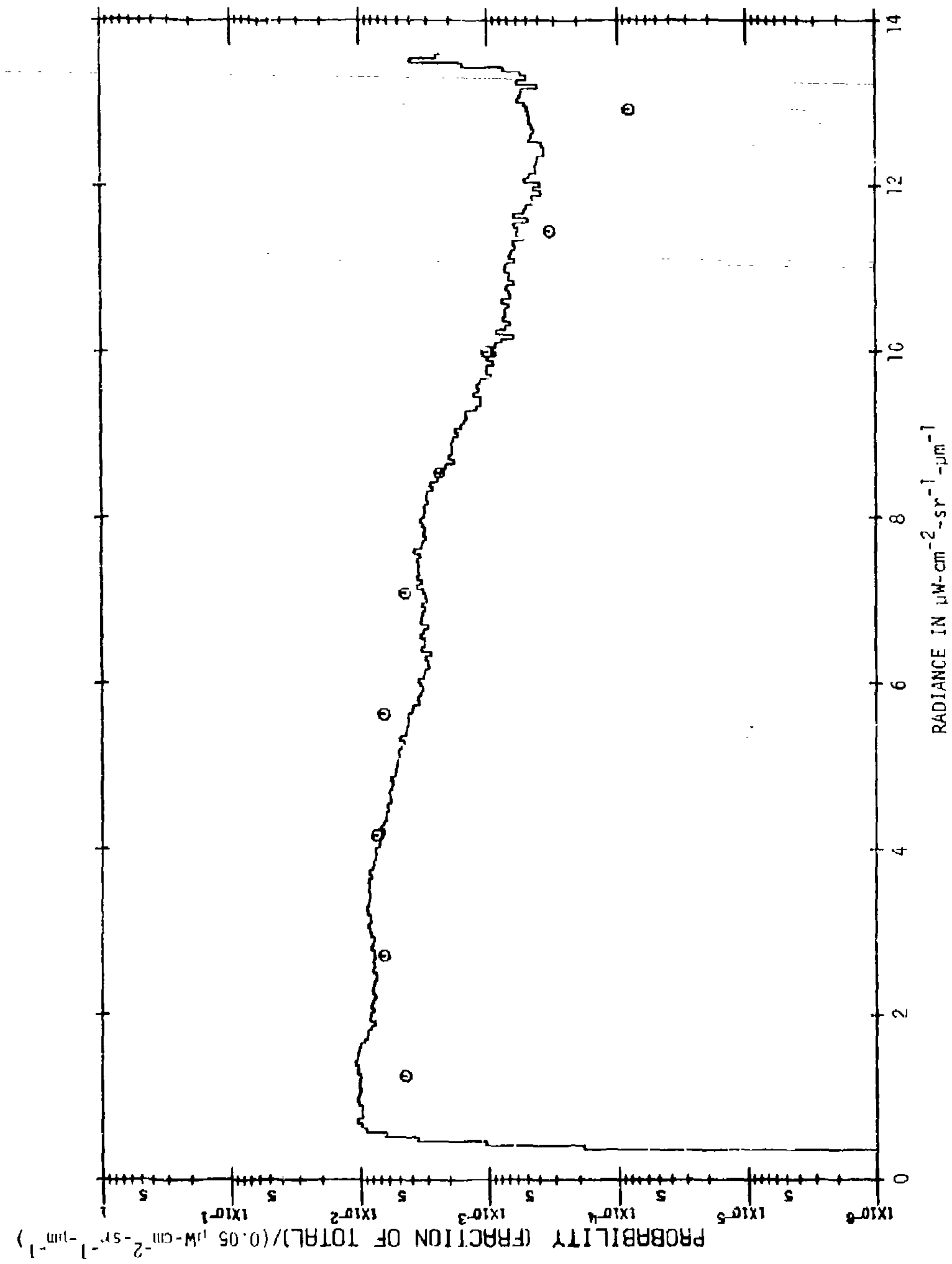
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



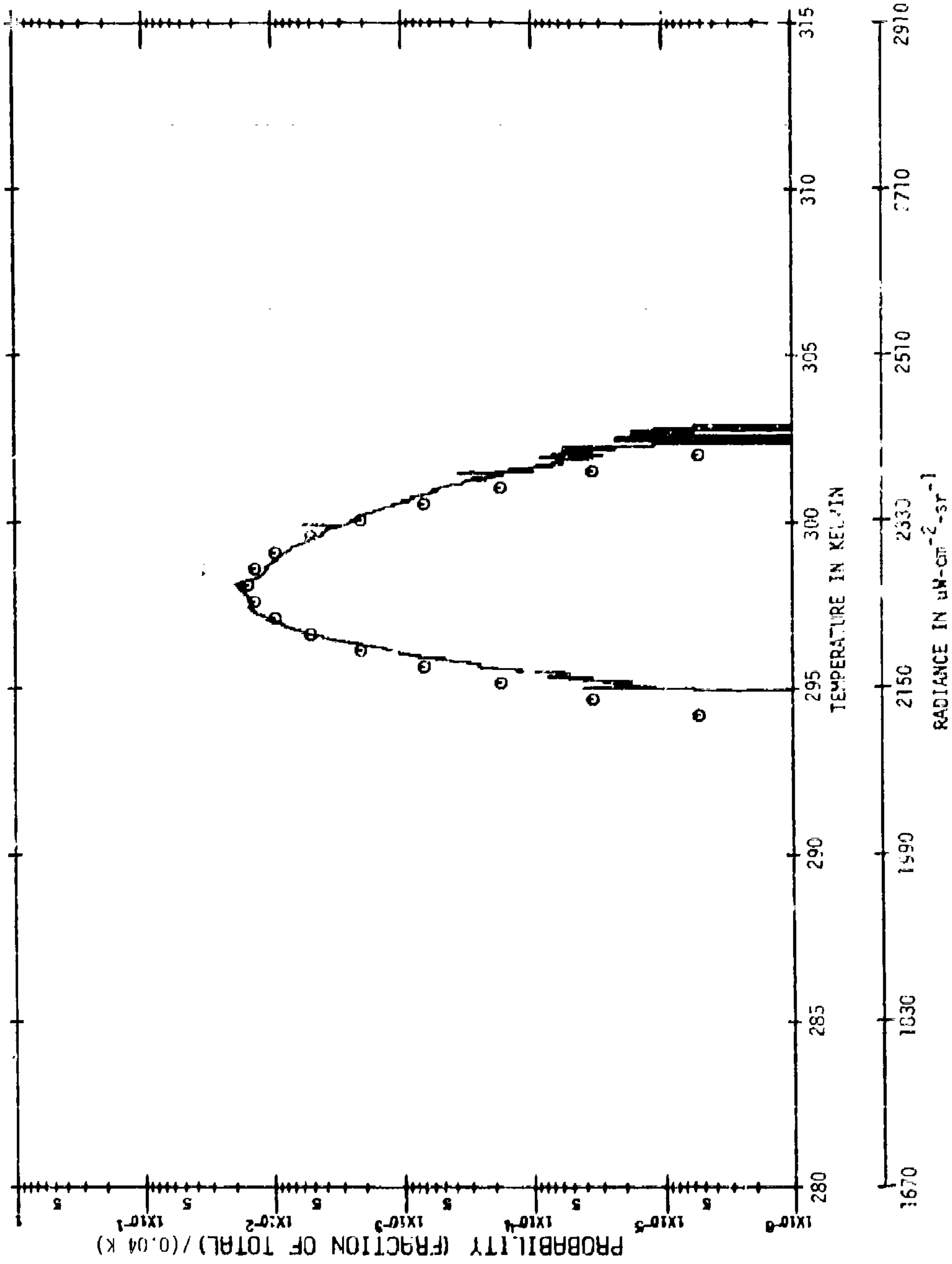
Area: MILL CREEK Wavelength = 1.0 - 1.4 um
Mean = 112.20
Std. Dev. = 62.27



RADIANCE IN μW-cm^{-2}-sr^{-1}-μm^{-1}
0
10
20
30
40
50
60
70
80
90
PROBABILITY (FRACTION OF TOTAL)/(0.35 μW-cm^{-2}-sr^{-1}-μm^{-1})
1
5
1X10^{-1}
1X10^{-2}
1X10^{-3}
1X10^{-4}
1X10^{-5}
1X10^{-6}
Area: MILL CREEK
Wavelength = 1.5 - 1.8 μm
Mean = 35.92
Std. Dev. = 20.18



Area: MILL CREEK   Wavelength = 2.0 - 2.6 μm
Mean = 4.13
Std. Dev. = 2.91



Area: MILL CREEK Wavelength = 9.3 - 11.7 um
Mean = 298.11
Std. Dev. = 0.98

MILL CREEK, OKLAHOMA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: Channel 2: 1.0 - 1.4 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 3: 1.5 - 1.8 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 4: 2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)

Channel 5: 9.3 - 11.7 μm (°K)

*Because of the relatively small temperature changes in the scenery, there is a nearly linear relationship between the temperature and radiance statistics for the thermal channels. It is pertinent, therefore, to compute correlations between radiance and temperature channels.

MILL CREEK

Number of Subregions = 1

Pixel Subarea Divisions at: 1 645

Line Subarea Divisions at: 11 276

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
3 (1.5 - 1.8 μm)
4 (2.0 - 2.6 μm)
5 (9.3 - 11.7 μm)

Correlation	2	3	4	5
2	1.000			
3	0.835	1.000		
4	0.869	0.880	1.000	
5	0.052	0.256	0.245	1.000

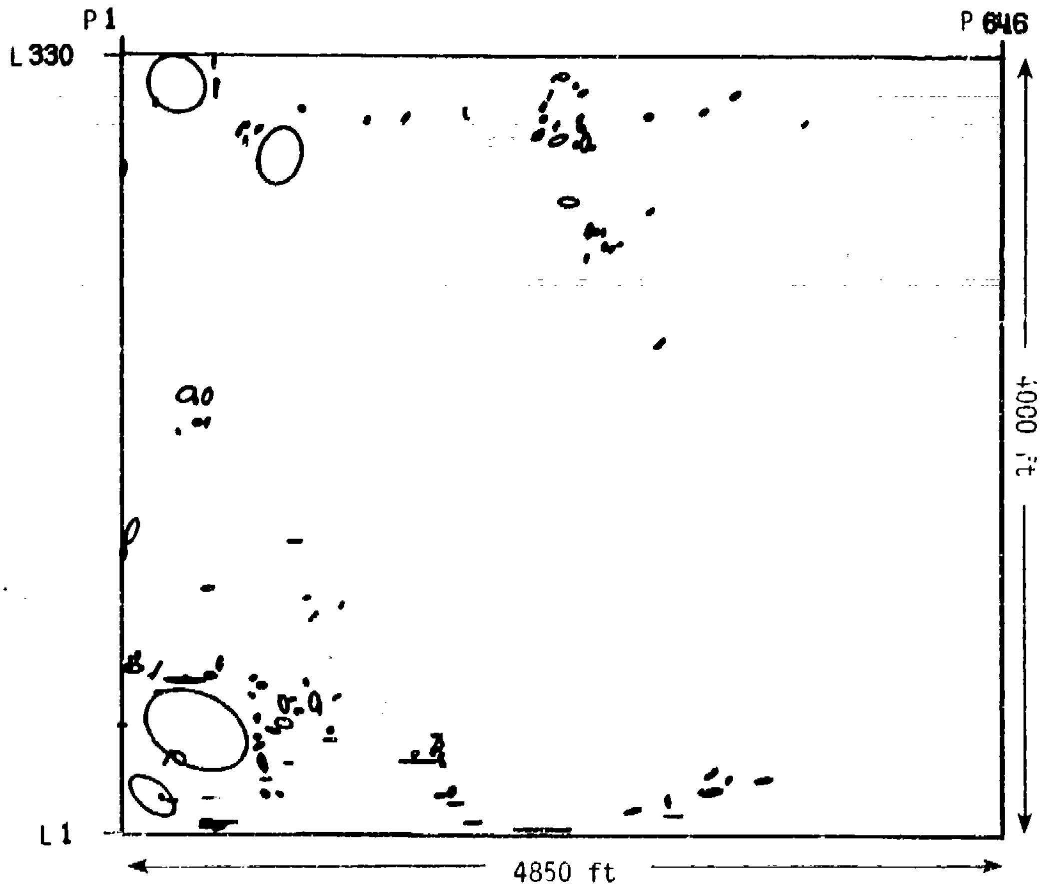
Channels	2	3	4	5
Mean	1.1220E+02	3.5919E+01	4.1767E+00	2.9811E+02
St. Dev.	6.2268E+01	2.0177E+01	2.9106E+00	9.7983E-01
Total Points	171570	171570	171570	171570

ERIM

MILL CREEK, OKLAHOMA

Ellipse Statistics

Spectral Bands: 1.0 - 1.4 μm
9.3 - 11.7 μm



Area: MILL CREEK (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 2.50 σ

Mean = 112.20 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 62.27 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

MILL CREEK
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 1.0 - 1.4 μm

Mean = 112.20 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 62.27 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	138
100.0 TO 200.0	21
200.0 TO 500.0	15
500.0 TO 1000.0	2
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	0
4000.0 TO 5000.0	1
5000.0 TO 6000.0	0
6000.0 TO 8000.0	1
8000.0 TO 10000.0	1
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	1
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

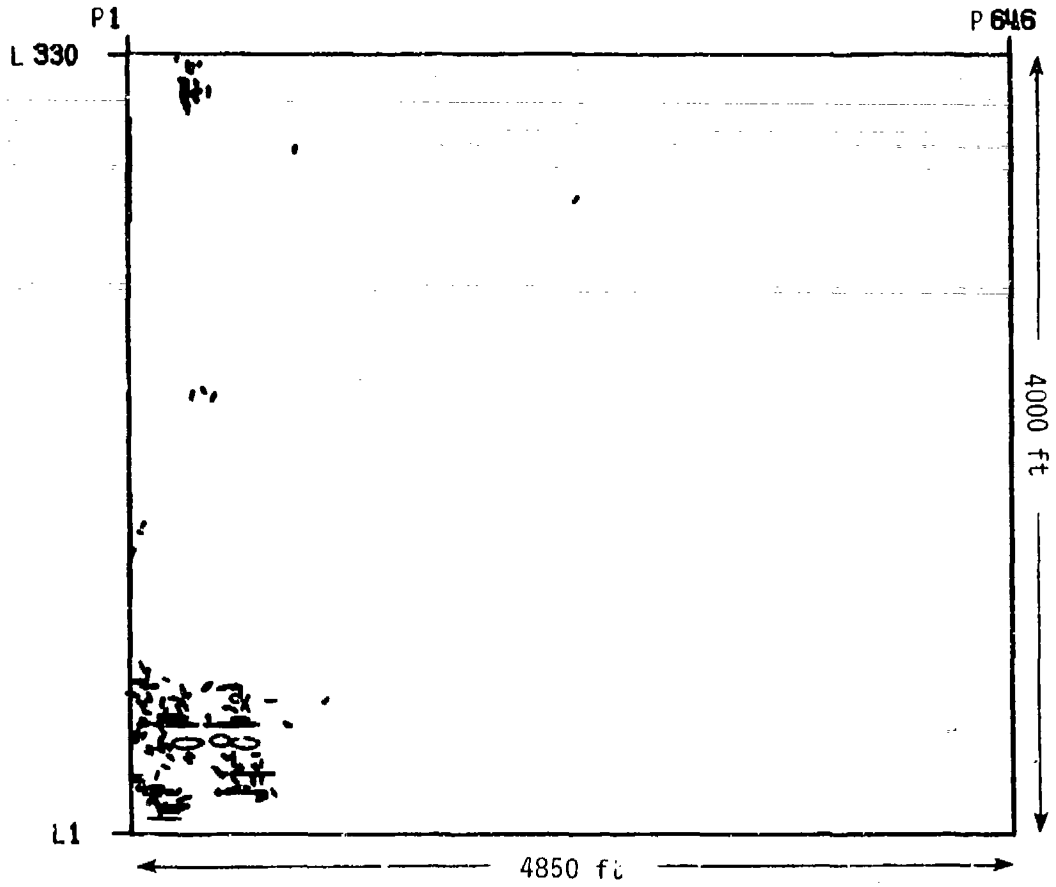
TOTAL NUMBER OF ELLIPTICAL AREAS = 180

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	134
50 TO 100	164 TO 328	26
100 TO 150	328 TO 492	6
150 TO 200	492 TO 656	6
200 TO 250	656 TO 820	1
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	3
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1969	0
600 TO 700	1969 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	1
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	2
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	86
1.2 TO 1.3	8
1.3 TO 1.4	20
1.4 TO 1.5	9
1.5 TO 1.6	7
1.6 TO 1.7	11
1.7 TO 1.8	10
1.8 TO 1.9	4
1.9 TO 2.0	4
2.0 TO 2.2	6
2.2 TO 2.4	6
2.4 TO 2.6	0
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	2
3.5 TO 4.0	2
OVER 4.0	3



Area: MILL CREEK (Wavelength = 1.0 - 1.4 μm)

Radiance Threshold = Mean + 3.00 σ

Mean = 112.20 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 62.27 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

MILL CREEK

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 1.0 - 1.4 μm

Mean = 112.20 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 62.27 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	173
100.0 TO 200.0	7
200.0 TO 500.0	7
500.0 TO 1000.0	3
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	0
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

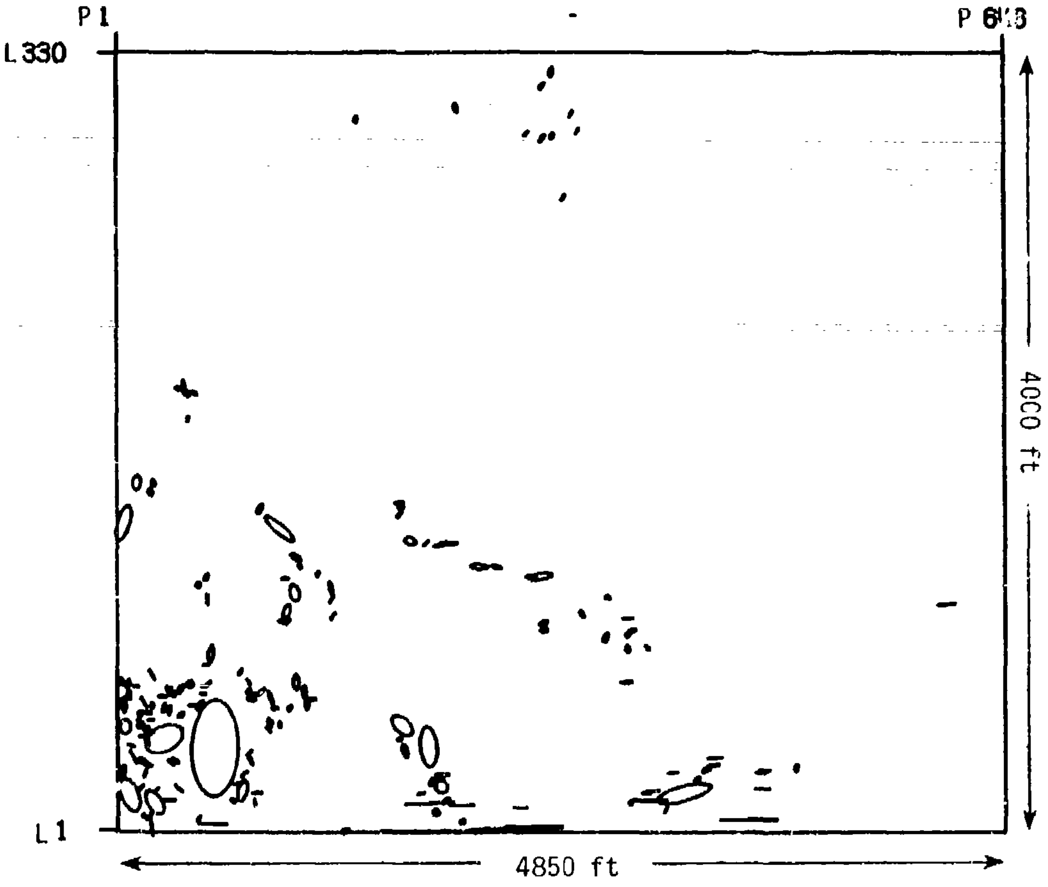
TOTAL NUMBER OF ELLIPTICAL AREAS = 190

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	169
50 TO 100	164 TO 328	11
100 TO 150	328 TO 492	4
150 TO 200	492 TO 656	5
200 TO 250	656 TO 820	0
250 TO 300	820 TO 984	1
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	129
1.2 TO 1.3	3
1.3 TO 1.4	10
1.4 TO 1.5	2
1.5 TO 1.6	14
1.6 TO 1.7	14
1.7 TO 1.8	4
1.8 TO 1.9	2
1.9 TO 2.0	1
2.0 TO 2.2	2
2.2 TO 2.4	2
2.4 TO 2.6	0
2.6 TO 2.8	2
2.8 TO 3.0	0
3.0 TO 3.5	2
3.5 TO 4.0	0
OVER 4.0	0



Area: MILL CREEK (Wavelength = 9.3 - 11.7 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 298.11 Kelvin

Std. Dev. = σ = 0.98 Kelvin

EQUIVALENT ELLIPTICAL AREAS

MILL CREEK
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ
Wavelength = 9.3 - 11.7 μm
Mean = 298.11 Kelvin
σ = 0.98 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	229
100.0 TO 200.0	16
200.0 TO 500.0	11
500.0 TO 1000.0	2
1000.0 TO 1500.0	3
1500.0 TO 2000.0	2
2000.0 TO 2500.0	1
2500.0 TO 3000.0	1
3000.0 TO 4000.0	0
4000.0 TO 5000.0	0
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	1
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

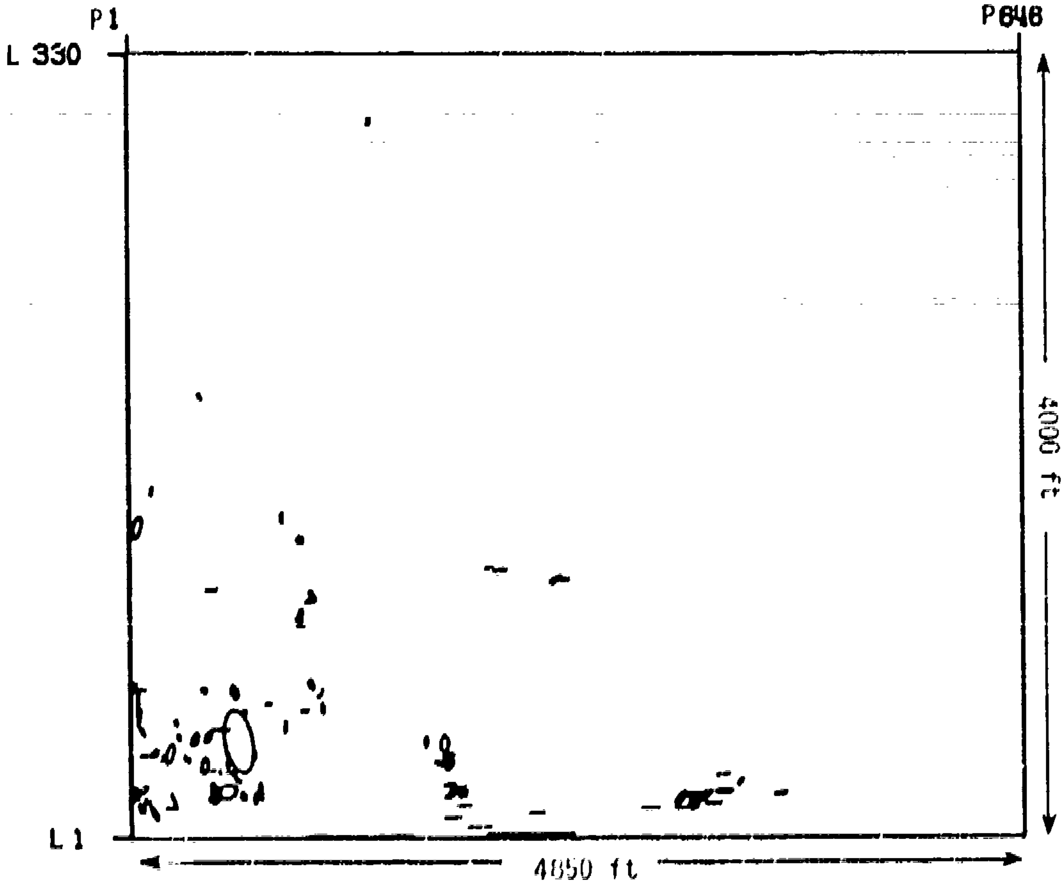
TOTAL NUMBER OF ELLIPTICAL AREAS = 266

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	223
50 TO 100	164 TO 328	22
100 TO 150	328 TO 492	8
150 TO 200	492 TO 656	3
200 TO 250	656 TO 820	1
250 TO 300	820 TO 984	1
300 TO 350	984 TO 1148	2
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	2
500 TO 600	1640 TO 1968	1
600 TO 700	1968 TO 2296	1
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	1
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	0
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	161
1.2 TO 1.3	9
1.3 TO 1.4	27
1.4 TO 1.5	10
1.5 TO 1.6	11
1.6 TO 1.7	15
1.7 TO 1.8	6
1.8 TO 1.9	2
1.9 TO 2.0	6
2.0 TO 2.2	5
2.2 TO 2.4	3
2.4 TO 2.6	2
2.6 TO 2.8	2
2.8 TO 3.0	2
3.0 TO 3.5	0
3.5 TO 4.0	3
OVER 4.0	2



Area: MILL CREEK (Wavelength = 9.3 - 11.7 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 298.11 Kelvin
Std. Dev. = σ = 0.98 Kelvin
EQUIVALENT ELLIPTICAL AREAS

MILL CREEK
DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 9.3 - 11.7 μm
Mean = 298.11 Kelvin
σ = 0.98 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
0.0 TO 100.0	112
100.0 TO 200.0	12
200.0 TO 500.0	7
500.0 TO 1000.0	1
1000.0 TO 1500.0	0
1500.0 TO 2000.0	0
2000.0 TO 2500.0	0
2500.0 TO 3000.0	0
3000.0 TO 4000.0	0
4000.0 TO 5000.0	1
5000.0 TO 6000.0	0
6000.0 TO 8000.0	0
8000.0 TO 10000.0	0
10000.0 TO 15000.0	0
15000.0 TO 20000.0	0
20000.0 TO 40000.0	0
40000.0 TO 80000.0	0
80000.0 TO 160000.0	0
OVER 160000.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 133

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 50	0 TO 164	106
50 TO 100	164 TO 328	17
100 TO 150	328 TO 492	5
150 TO 200	492 TO 656	2
200 TO 250	656 TO 820	2
250 TO 300	820 TO 984	0
300 TO 350	984 TO 1148	0
350 TO 400	1148 TO 1312	0
400 TO 500	1312 TO 1640	0
500 TO 600	1640 TO 1968	0
600 TO 700	1968 TO 2296	0
700 TO 800	2296 TO 2624	0
800 TO 900	2624 TO 2952	0
900 TO 1000	2952 TO 3280	0
1000 TO 1200	3280 TO 3937	0
1200 TO 1400	3937 TO 4593	1
1400 TO 1600	4593 TO 5249	0
1600 TO 2000	5249 TO 6561	0
OVER 2000	OVER 6561	0

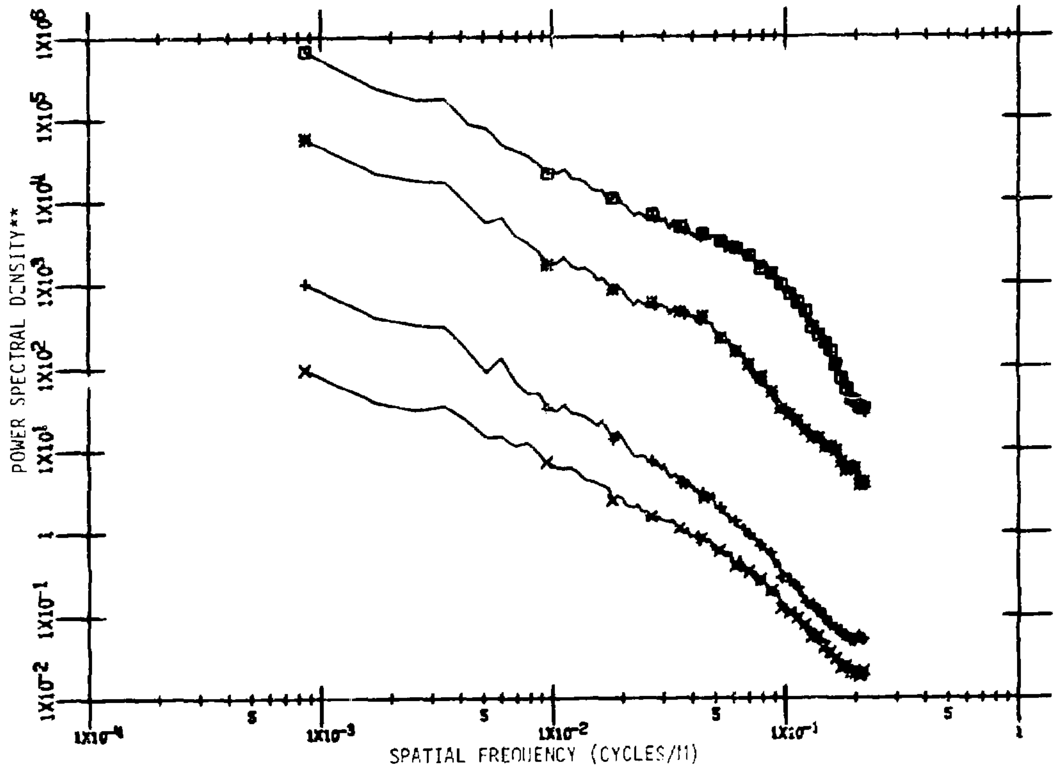
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	77
1.2 TO 1.3	4
1.3 TO 1.4	15
1.4 TO 1.5	4
1.5 TO 1.6	6
1.6 TO 1.7	3
1.7 TO 1.8	4
1.8 TO 1.9	4
1.9 TO 2.0	4
2.0 TO 2.2	3
2.2 TO 2.4	1
2.4 TO 2.6	5
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
OVER 4.0	1

MILL CREEK, OKLAHOMA

Power Spectra

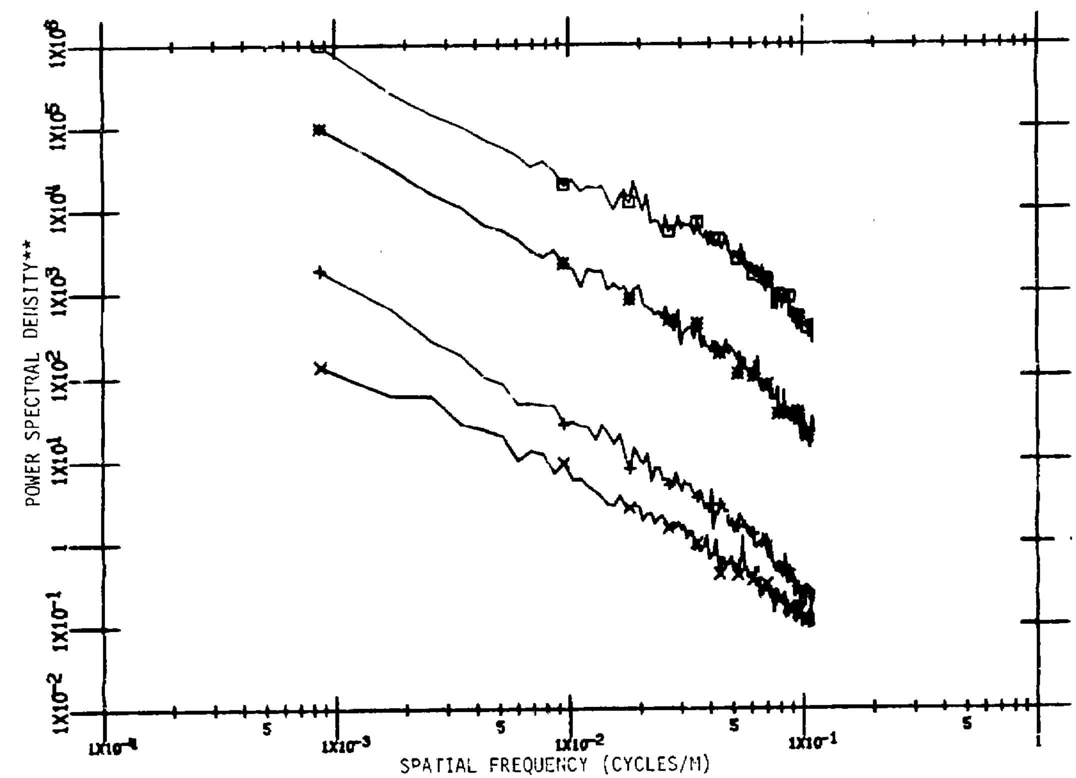
Spectral Bands: 1.0 - 1.4 μm
1.5 - 1.8 μm
2.0 - 2.6 μm
9.3 - 11.7 μm



Area: MILL CREEK CROSS-TRACK Wavelength = 1.0-1.4 (⊡), 1.5-1.8 (*), 2.0-2.6 (+), 9.3-11.7 (X)

POWER SPECTRA

**Power spectral desnity is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 μm bands, and $(^{\circ}K)^2$/cycle/meter for 9.3 to 11.7 μm band.



Area: MILL CREEK IN-TRACK Wavelength = 1.0-1.4 (⊡), 1.5-1.8 (*), 2.0-2.6 (+), 9.3-11.7 (X)

POWER SPECTRA

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for 1.0 to 1.4, 1.5 to 1.8, and 2.0 to 2.6 μm bands, and $(°K)^2$/cycle/meter for 9.3 to 11.7 μm band.

MONO LAKE, CALIFORNIA*

Pertinent Scene and Flight Information

(Date of Flight: 23 September 1968)

*For specific discuss[illegible] these and associated data for this scenery, refer to Reference 1.

MONO LAKE Data

Wavelength Bands:

1.0-1.4 μm, 2.0-2.6 μm, 4.5-5.5 μm, 8.0-13.5 μm

IFOV: 3.5 mrad (cross-track); 6.6 mrad (in-track)

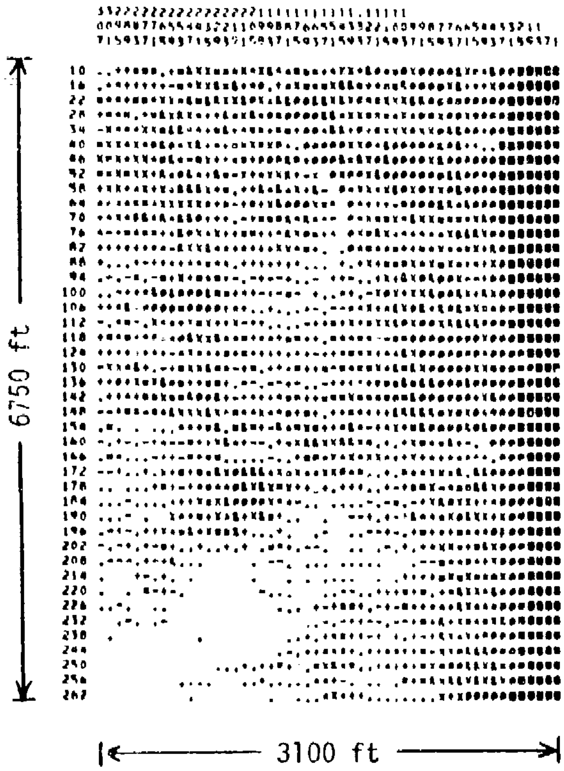
Altitude: 4000 ft Depression Angle: 90°

Time: 1000 hrs Flight Direction: South

Ground Speed: $\sim$200 ft-sec^{-1}

Area Covered (Approx.): 3100 ft wide x 6750 ft long

Meteorology: Visibility > 15 mi; clear and bright; dry



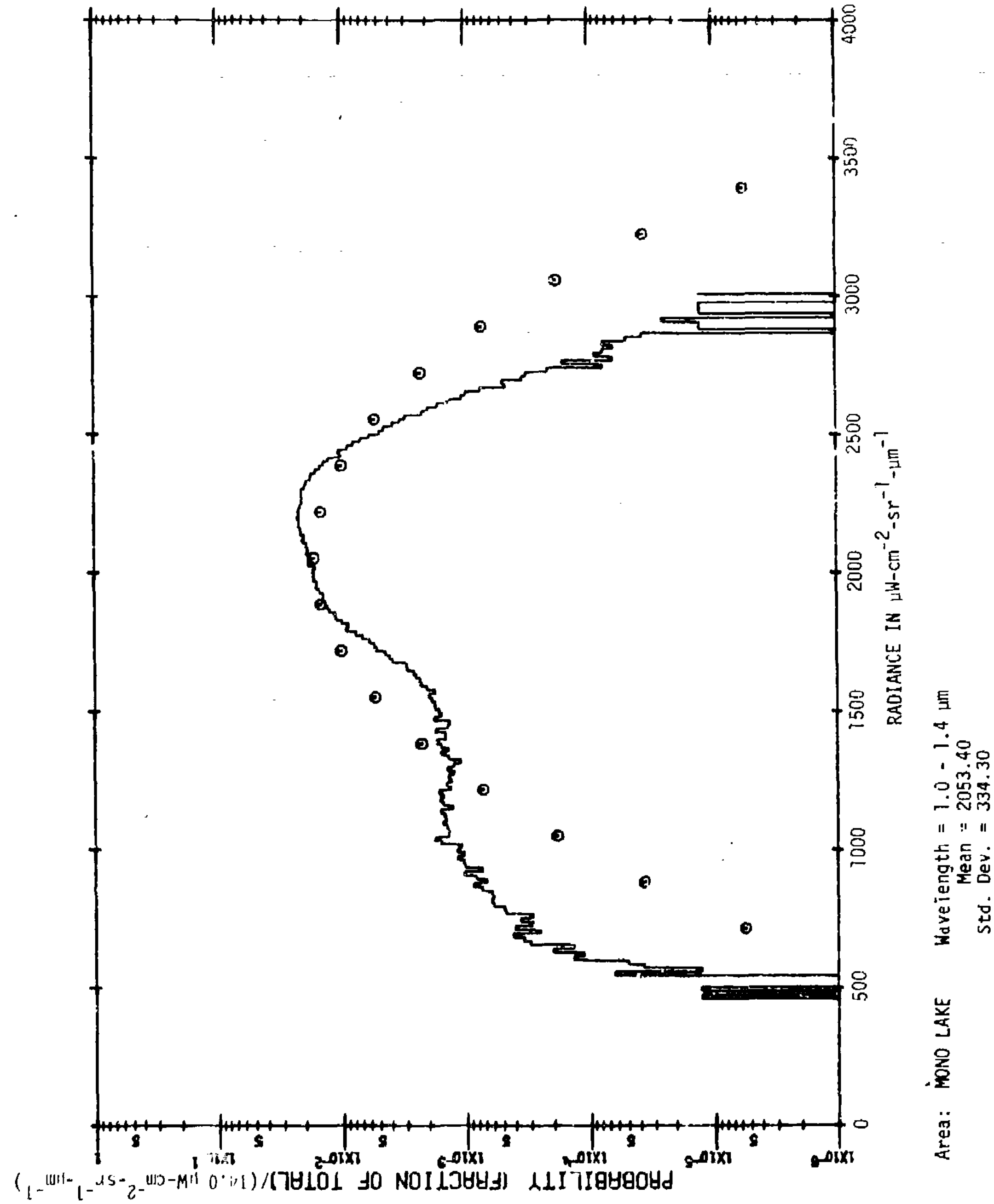
GREYMAP OF MONO LAKE

MONO LAKE, CALIFORNIA

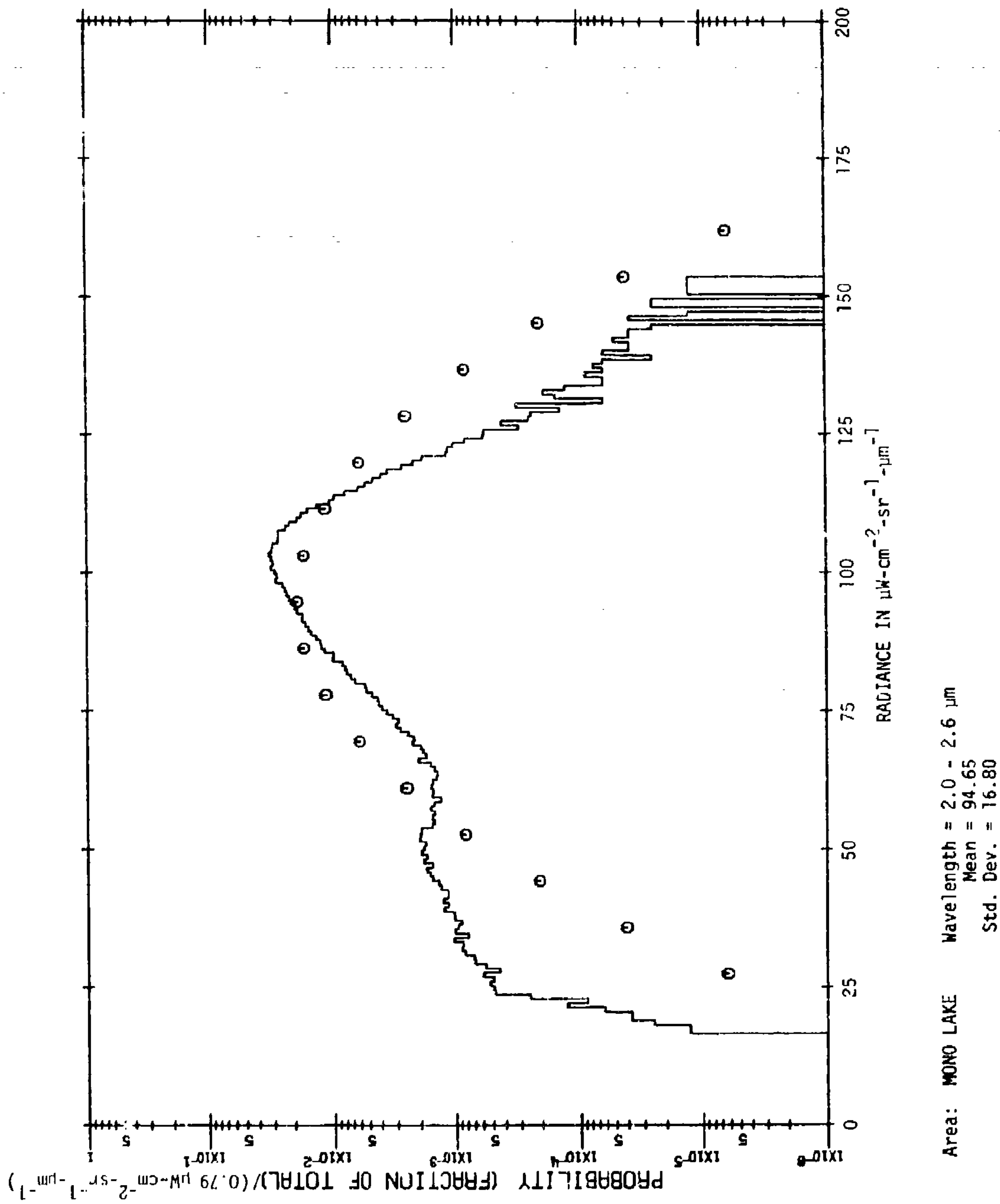
Histograms*

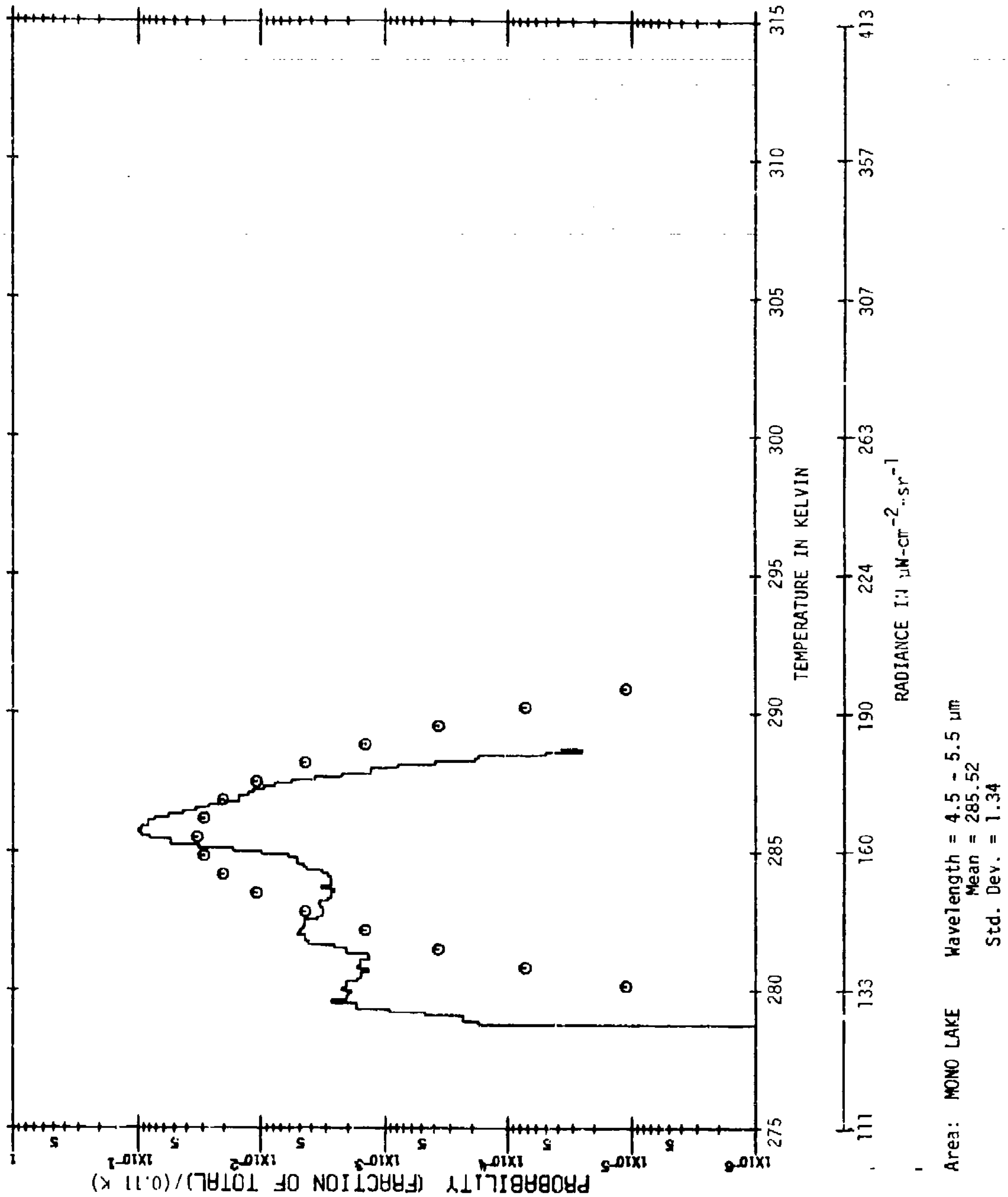
Spectral Bands: 1.0 - 1.4 μm
2.0 - 2.6 μm
4.5 - 5.5 μm
8.0 - 13.5 μm

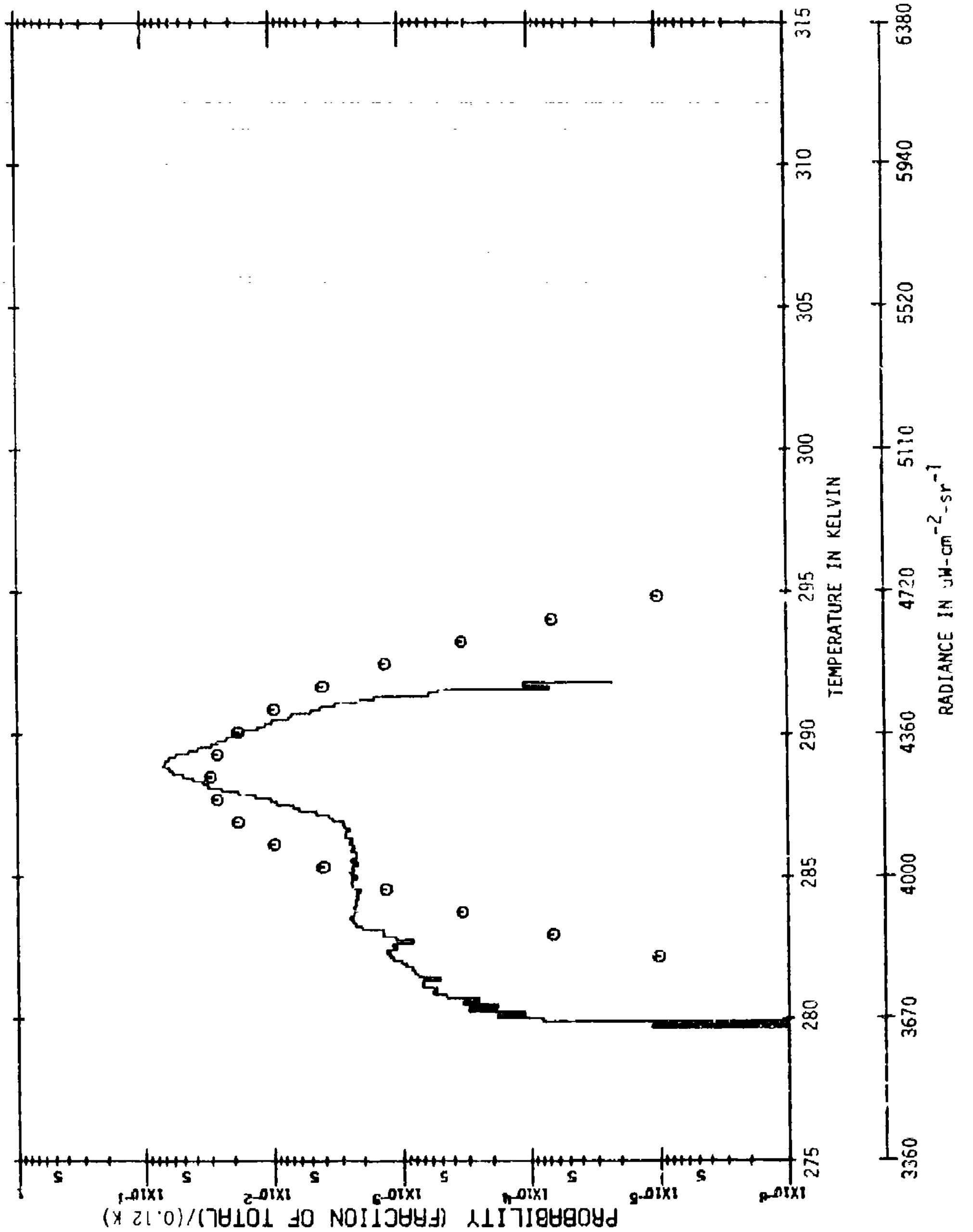
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram.



PROBABILITY (FRACTION OF TOTAL)/(1.0 μW-cm-2-sr-1-μm-1)
1X10-6
5
1X10-5
5
1X10-4
5
1X10-3
5
1X10-2
5
1X10-1
5
1
0
500
1000
1500
2000
2500
3000
3500
4000
RADIANCE IN μW-cm-2-sr-1-μm-1
Area: MONO LAKE
Wavelength = 1.0 - 1.4 μm
Mean = 2053.40
Std. Dev. = 334.30


PROBABILITY (FRACTION OF TOTAL)/(0.79 μW-cm^{-2}-sr^{-1}-μm^{-1})
RADIANCE IN μW-cm^{-2}-sr^{-1}-μm^{-1}
0
25
50
75
100
125
150
175
200
1
5
1X10^{-1}
1X10^{-2}
1X10^{-3}
1X10^{-4}
1X10^{-5}
1X10^{-6}
Area: MONO LAKE
Wavelength = 2.0 - 2.6 μm
Mean = 94.65
Std. Dev. = 16.80


TEMPERATURE IN KELVIN
275
280
285
290
295
300
305
310
315
RADIANCE IN µW-cm^{-2}·sr^{-1}
111
133
160
190
224
263
307
357
413
PROBABILITY (FRACTION OF TOTAL)/(0.11 K)
1
1X10^{-1}
1X10^{-2}
1X10^{-3}
1X10^{-4}
1X10^{-5}
1X10^{-6}
Area: MONO LAKE
Wavelength = 4.5 - 5.5 µm
Mean = 285.52
Std. Dev. = 1.34



Area: MONO LAKE Wavelenuth = 8.0 - 13.5 μm
Mean = 288.50
Std. Dev. = 1.58

MONO LAKE, CALIFORNIA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands:	Channel 2:	1.0 - 1.4 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)
	Channel 4:	2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)
	Channel 5:	4.5 - 5.5 μm (°K)
	Channel 20:	8.0 - 13.5 μm (°K)

*The Mono Lake data were collected with an M-5 scanner with thermal calibration plates in part of the scanner field-of-view. The 8.0-13.5 μm detector and the 1.0-1.4, 2.0-2.6, 4.5-5.5 μm detectors were on opposite ends of the scanner and are not in spatial registration. Hence, spectral correlation coefficients were not determined between the 8.0-13.5 μm data and the 1.0-1.4, 2.0-2.6, and 4.5-5.5 μm data.

MONO LAKE

Number of Subregions = 1

Pixel Subarea Divisions at: 1 311

Line Subarea Divisions at: 10 266

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 2 (1.0 - 1.4 μm)
4 (2.0 - 2.6 μm)
5 (4.5 - 5.5 μm)

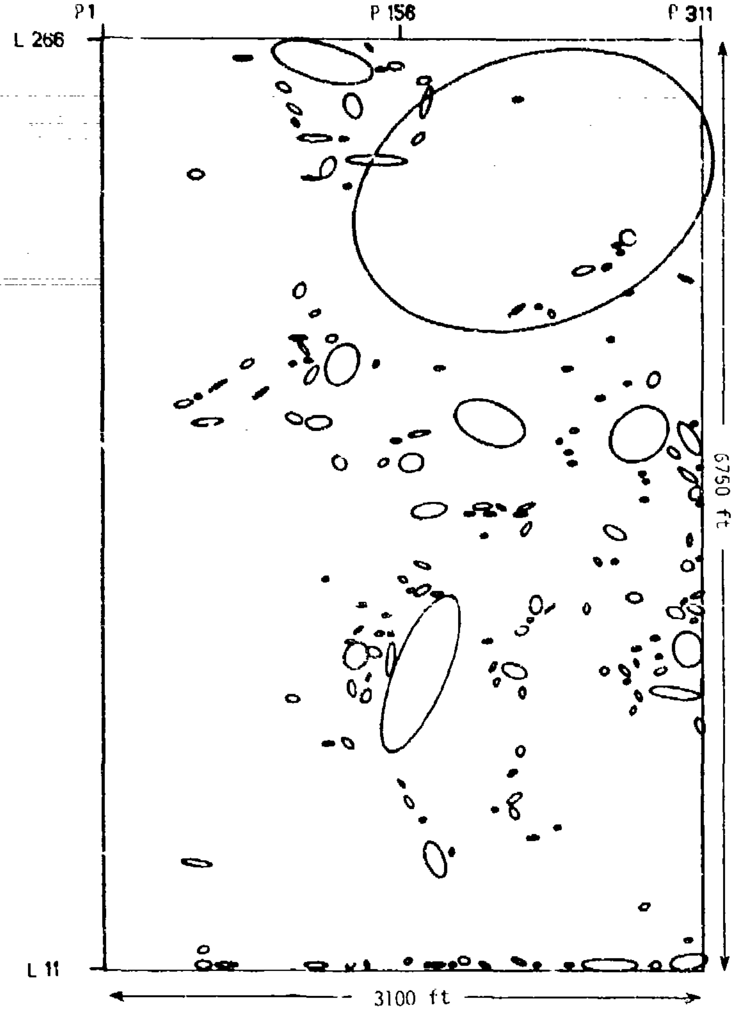
Correlation	2	4	5
2	1.000		
4	0.892	1.000	
5	0.833	0.814	1.000

Channels	2	4	5	20
Mean	2.0534E+03	9.4652E+01	2.8552E+02	2.8850E+02
St. Dev.	3.3430E+02	1.6804E+01	1.3413E+00	1.5789E+00
Total Points	79360	79360	79360	87730

MONO LAKE, CALIFORNIA

Ellipse Statistics

Spectral Band: 4.5 - 5.5 μm



Area: MONO LAKE (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 0.63 σ
Mean = 285.52 Kelvin
Std. Dev. = σ = 1.34 Kelvin
EQUIVALENT ELLIPTICAL AREAS

MONO LAKE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 0.63 σ

Wavelength = 4.5 - 5.5 μm

Mean = 285.52 Kelvin

σ = 1.34 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
80.0	TO	100.0	0
100.0	TO	150.0	60
150.0	TO	200.0	19
200.0	TO	250.0	14
250.0	TO	300.0	8
300.0	TO	400.0	20
400.0	TO	500.0	15
	OVER	500.0	40

TOTAL NUMBER OF ELLIPTICAL AREAS = 176

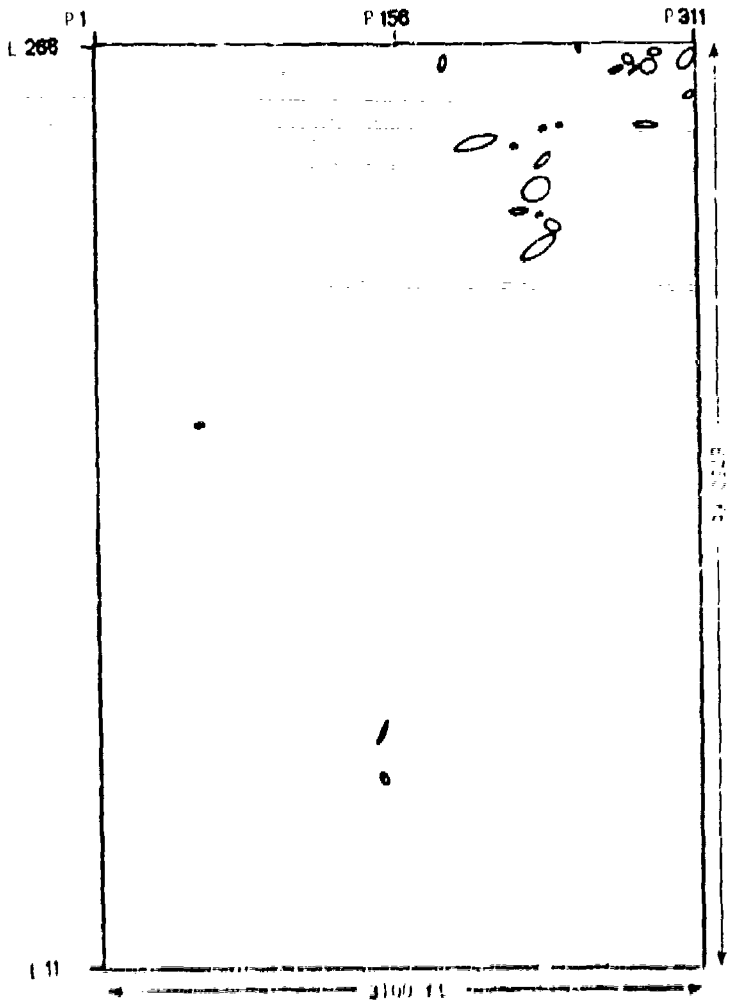
87 FEATURES WITH AREAS LESS THAN80.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	30
45	TO	55	147	TO	180	23
55	TO	71	180	TO	232	29
71	TO	100	232	TO	328	32
OVER		100	OVER		328	62

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	31
1.2	TO	1.3	39
1.3	TO	1.4	22
1.4	TO	1.5	17
1.5	TO	1.6	13
1.6	TO	1.7	10
1.7	TO	1.8	10
1.8	TO	1.9	8
1.9	TO	2.0	5
2.0	TO	2.4	10
2.4	TO	2.6	2
2.6	TO	2.8	1
2.8	TO	3.0	2
3.0	TO	3.5	1
3.5	TO	4.0	2
4.0	TO	4.5	1
	OVER	4.5	2



Area: MONO LAKE (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 1.63 σ
Mean = 285.52 Kelvin
Std. Dev. = σ = 1.34 Kelvin
EQUIVALENT ELLIPTICAL AREAS

MONO LAKE

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.63 σ

Wavelength = 4.5 - 5.5 μm

Mean = 285.52 Kelvin

σ = 1.34 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
80.0 TO 100.0	0
100.0 TO 150.0	7
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	3
300.0 TO 400.0	5
400.0 TO 500.0	0
OVER 500.0	8

TOTAL NUMBER OF ELLIPTICAL AREAS = 23

13 FEATURES WITH AREAS LESS THAN80.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	4
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	1
71 TO 100	232 TO 328	5
OVER 100	OVER 328	11

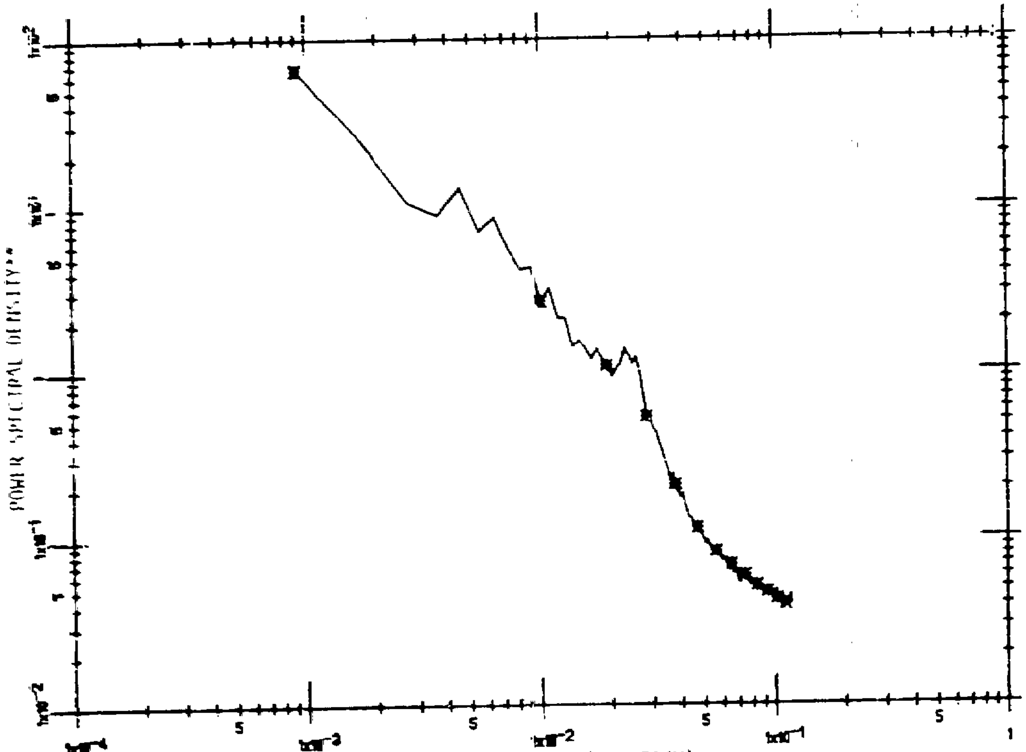
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	0
1.1 TO 1.2	4
1.2 TO 1.3	2
1.3 TO 1.4	2
1.4 TO 1.5	2
1.5 TO 1.6	3
1.6 TO 1.7	3
1.7 TO 1.8	0
1.8 TO 1.9	1
1.9 TO 2.0	0
2.0 TO 2.4	5
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

MONO LAKE, CALIFORNIA

Power Spectra

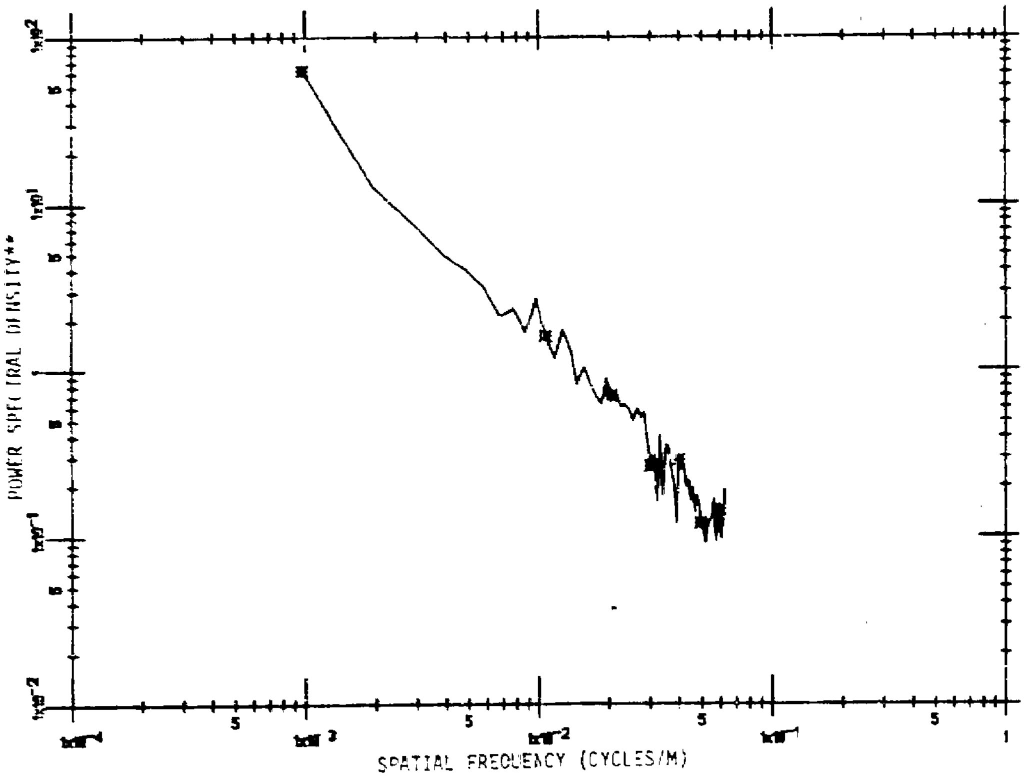
Spectral Band: 4.5 - 5.5 μm



Area: MONO LAKE CROSS-TRACK Wavelength = 4.5-5.5 (*)

POWER SPECTRA

**Power spectral density is $(^\circ K)^2$/cycle/meter for the 4.5 to 5.5 um band.



Area: MONO LAKE IN-TRACK wavelength = 4.5-5.5 (*)

POWER SPECTRA

**Power spectral density is (°K)^2/cycle/meter for the 4.5 to 5.5 µm band.

NELLIS AFB, NEVADA*

Pertinent Scene and Flight Information

(Dates of Flights: 25,26 February 1978)

*For specific discussions of these and associated data for this scenery, refer to References 2 and 3.

Mountainous Terrain

Wavelength Bands:

NEVB: 3.5-3.9 μm
NEVF: 3.5-3.9 μm
NEVG1: 2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm, 9.0-11.4 μm
NEVI: 2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm
NEVM: 3.5-3.9 μm
NEVN: 2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm, 9.0-11.4 μm

IFOV: 2.5 mrad

Altitude:

NEVB(F,I,M,N)
1000 ft

NEVG1
1750 ft

Depression Angle:

NEVB(F,I,M,N)
35°

NEVG1
90°

Time:

NEVG1: 0930 hrs
NEVF(M,N): 1100 hrs
NEVB(I): 1500 hrs

Flight Direction:

NEVB(F,I,M,N): East
NEVG1: West

Ground Speed: 200 ft-sec^{-1}

Area Covered (Approx.): 1750 ft wide x 6750 ft long

Meteorology:

(2-25-78, AM) - NEVF(G1)
High, thin scattered clouds; visibility = 15 mi.

(2-25-78, PM) - NEVB(I)
Scattered clouds; light haze; visibility = 35 mi.

(2-26-78, AM) - NEVM(N)
High overcast; light haze; visibility = 15 mi.

Desert Terrain (Including Dry Lake)

Wavelength Bands:

NEVC1: 3.5-3.9 μm
NEVH1: 2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm, 9.0-11.4 μm
NEVL: 3.5-3.9 μm

IFOV: 2.5 mrad

Altitude: 1000 ft

Depression Angle: 35°

Time:

NEVC1(H1): 1100 hrs
NEVL: 1600 hrs

Flight Direction:

NEVC1: West
NEVH1(L): East

Ground Speed: 200 ft-sec^{-1}

Area Covered (Approx.):

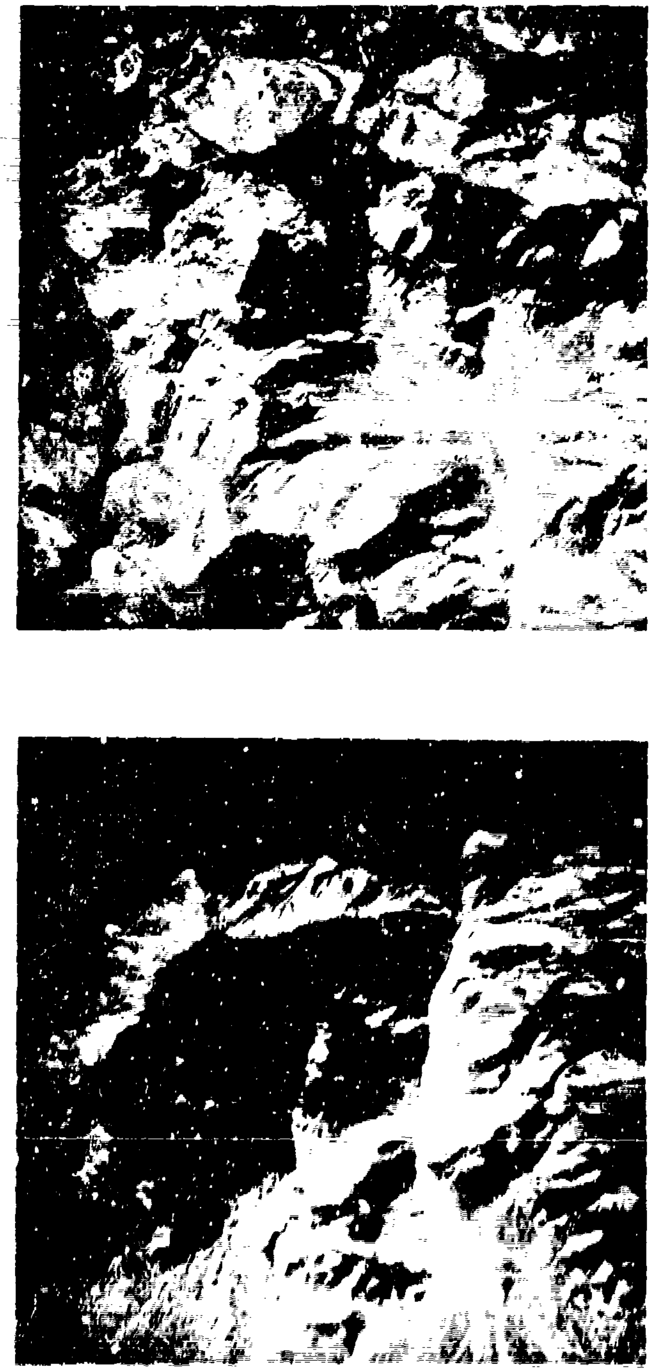
NEVC1 (Desert): 1750 ft wide x 3400 ft long

NEVH1(L) (Desert): 1750 ft wide x 3400 ft long
(Dry Lake): 1750 ft wide x 3400 ft long

Meteorology:

NEVC1(H1)
High, thin scattered clouds; visibility = 15 mi.

NEVL
Complete cloud cover; light haze; visibility = 35 mi.



AERIAL PHOTOS, NELLIS AFB MOUNTAINS

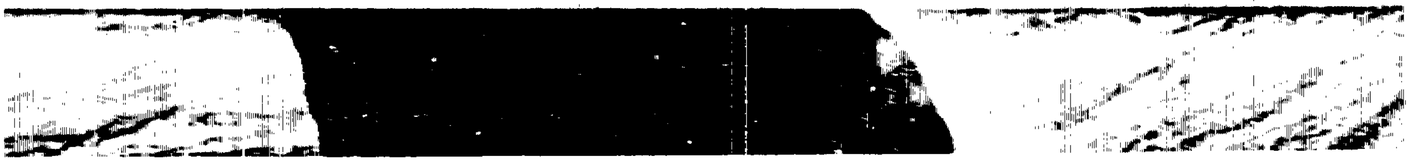
(a) 3.5 - 3.9 μm

(b) 9.0 - 11.4 μm

MOUNTAIN NELLIS AFB IMAGERY

(a) 2.0 - 2.6 μm

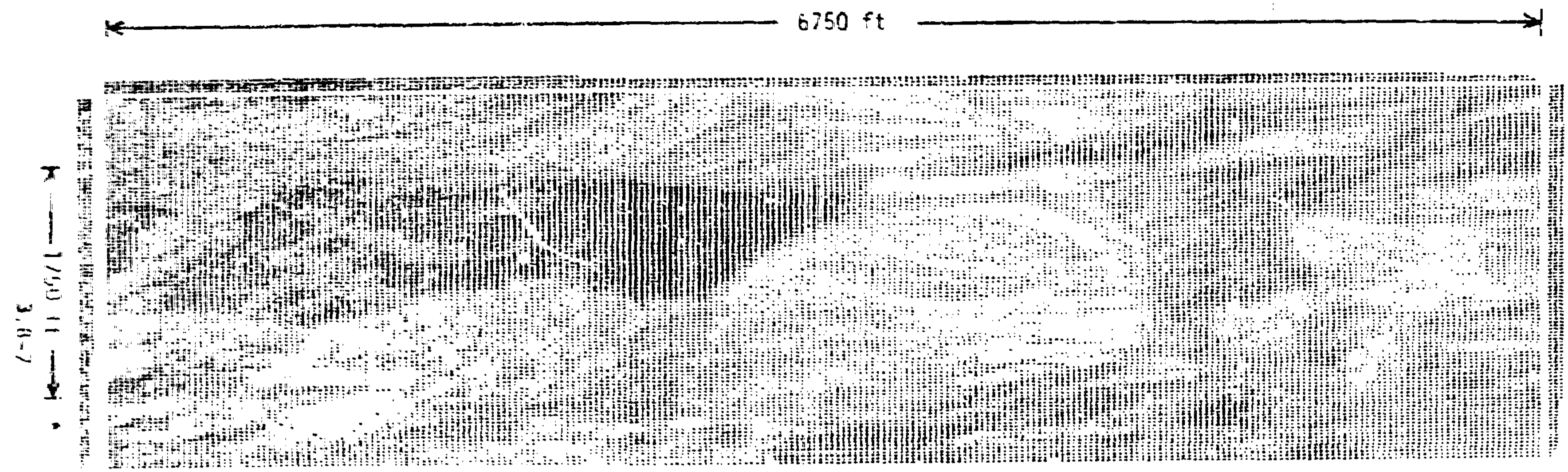
(b) 3.5 - 3.9 μm



(c) 4.5 - 5.5 μm

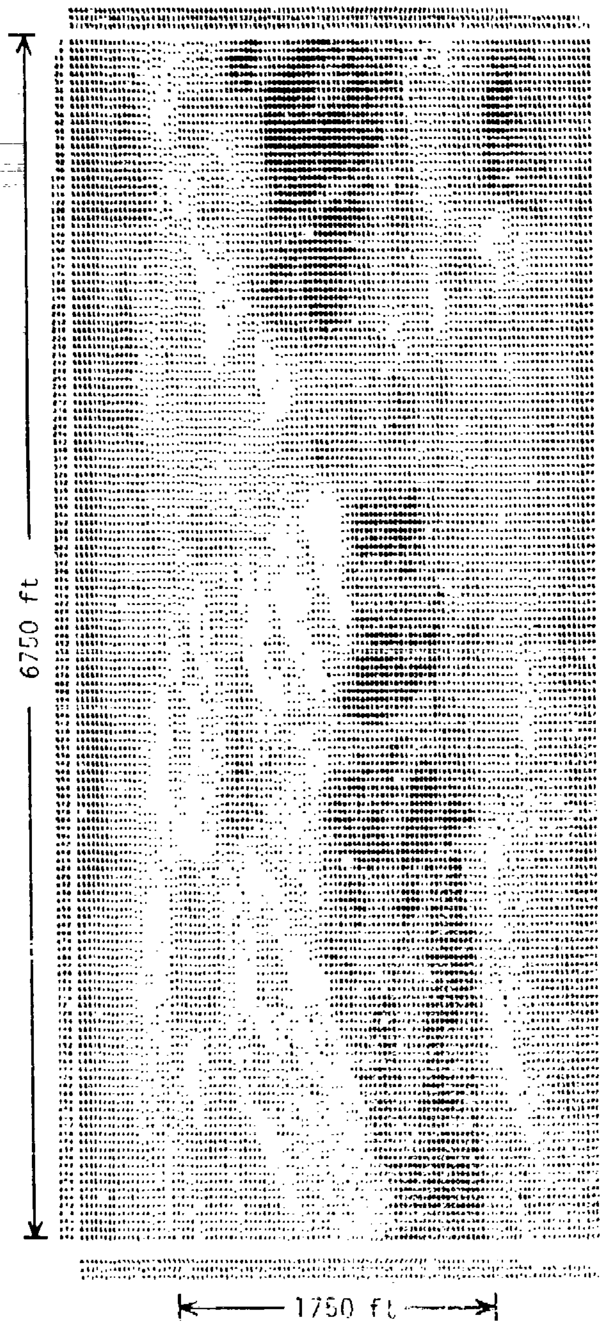
(d) 9.0 - 11.4 μm

DESERT AND DRY LAKE NELLIS AFB IMAGERY

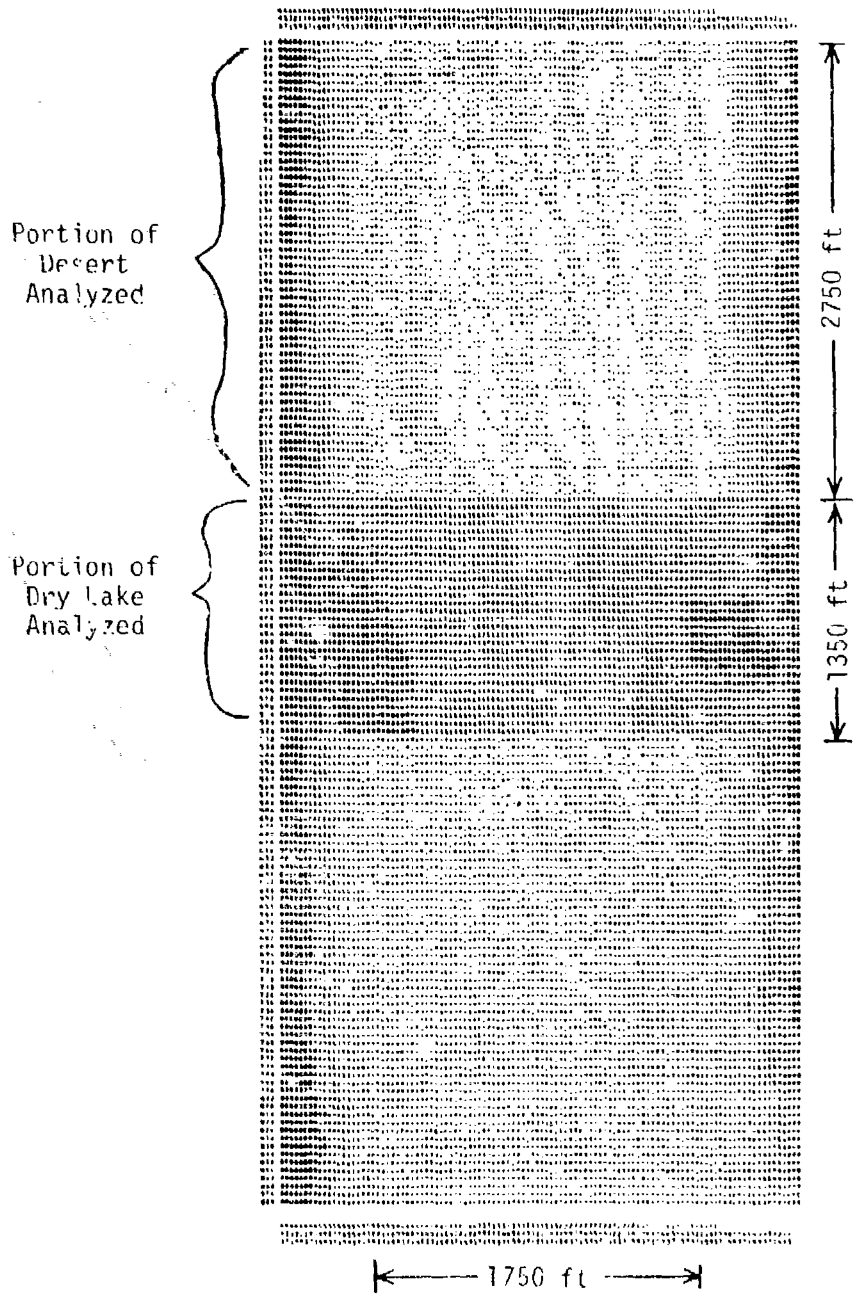


GREYMAP OF NELLIS AFB MOUNTAINS (NEVG1)

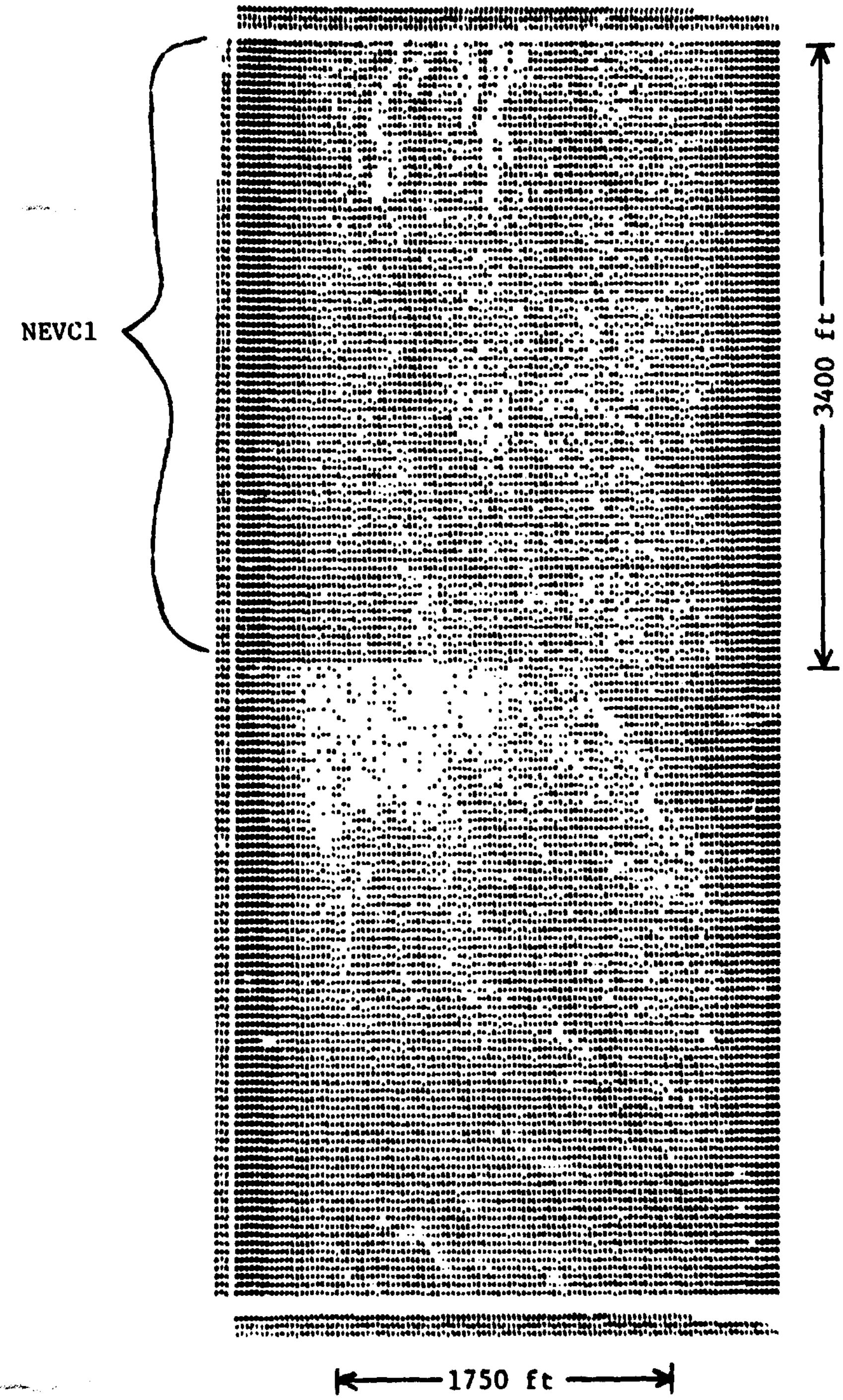
*(Note: Because of vignetting, the pixel range analyzed on the Nellis AFB scenes was 123-523.)



GREYMAP OF NELLIS AFB MOUNTAINS (NEVF)



GREYMAP OF NELLIS AFB DESERT (NEVH1)



GREYMAP OF NELLIS AFB DESERT (NEVC)

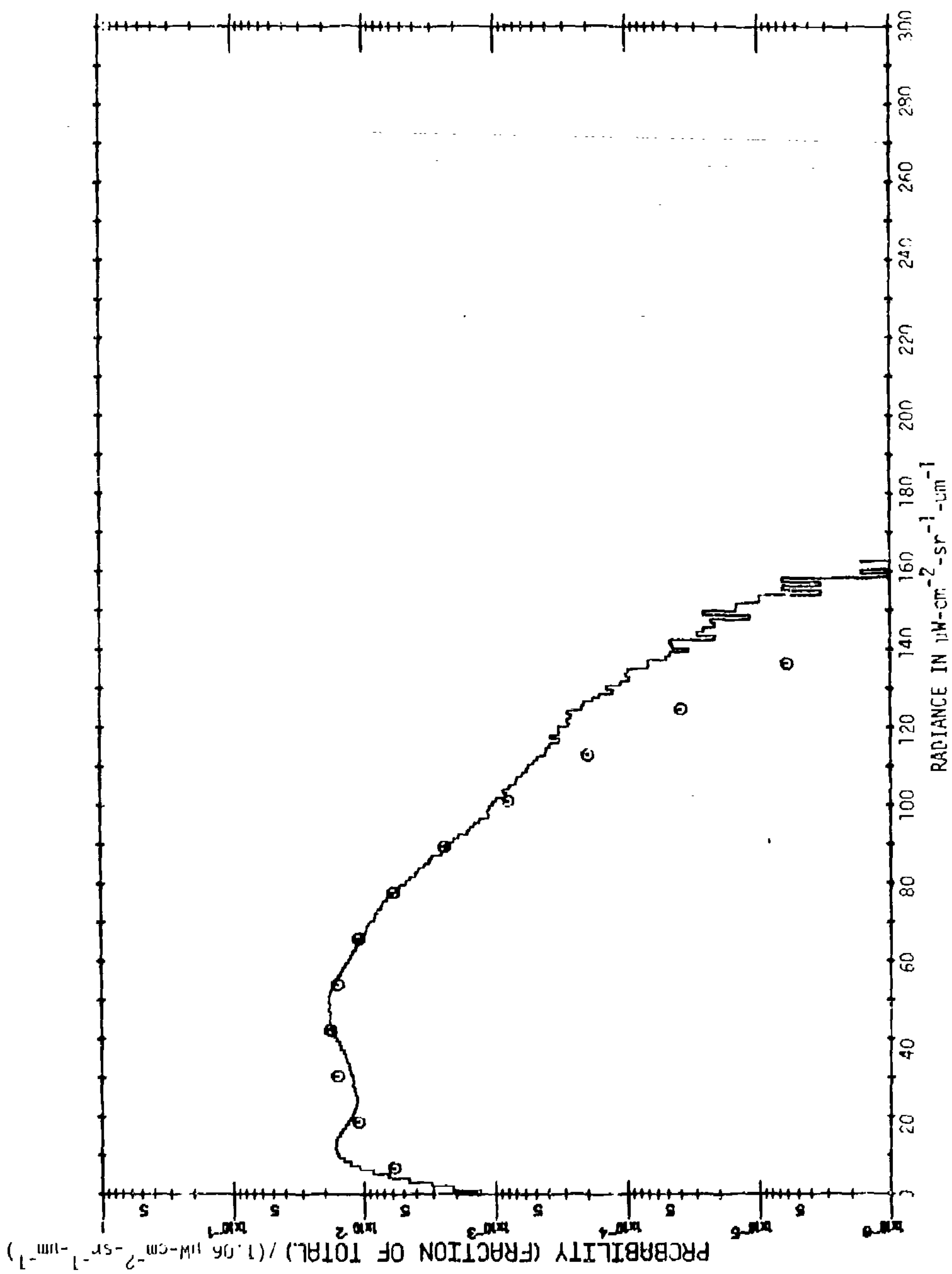
NELLIS AFB, NEVADA

Histograms*

Spectral Bands: 2.0 - 2.6 μm
3.0 - 4.2 μm
3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

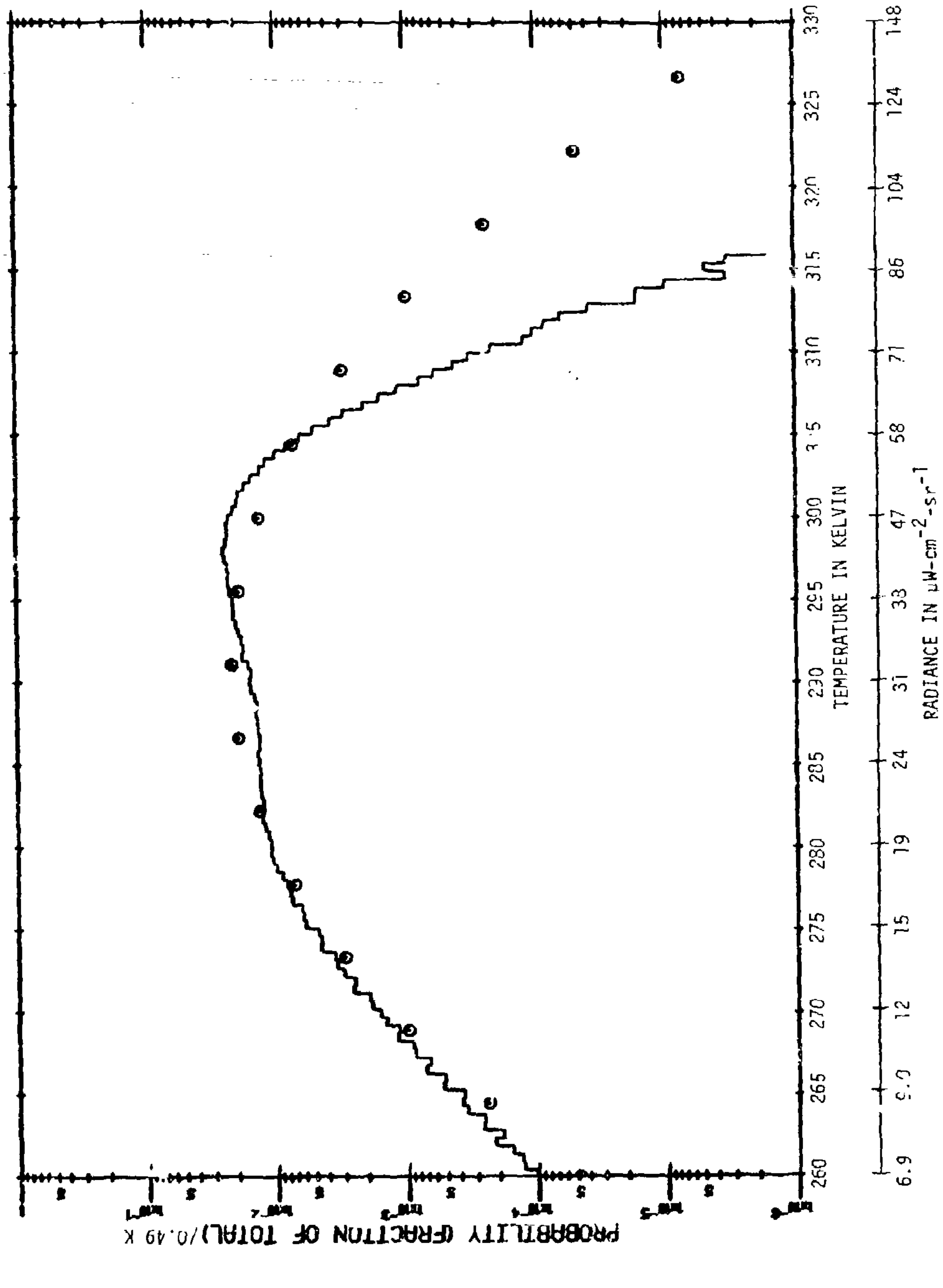
---

*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



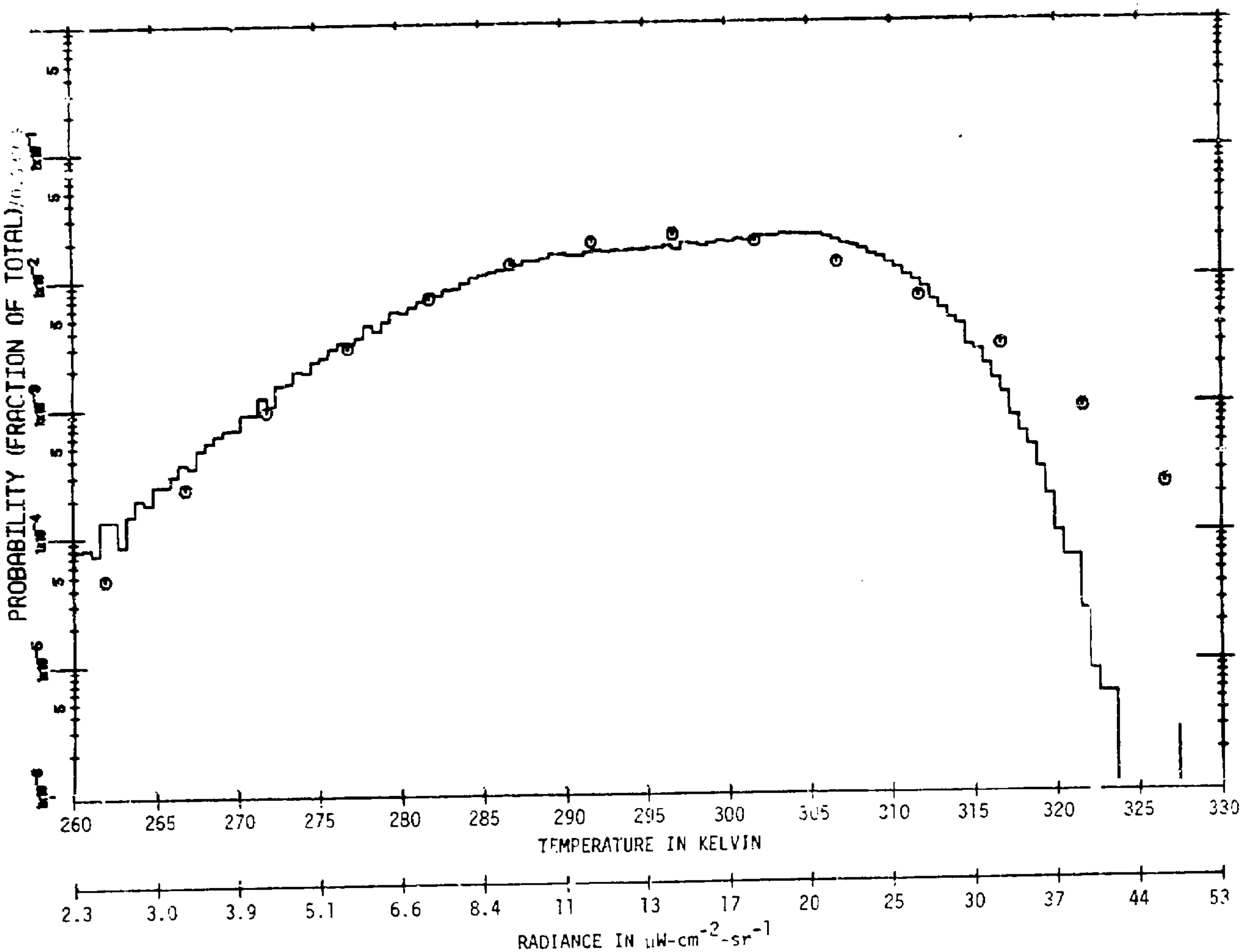
Area: NVG1 Wavelength = 2.0 - 2.6 µm
Mean = 42.12
Std. Dev. = 23.56

MOUNTAINOUS TERRAIN



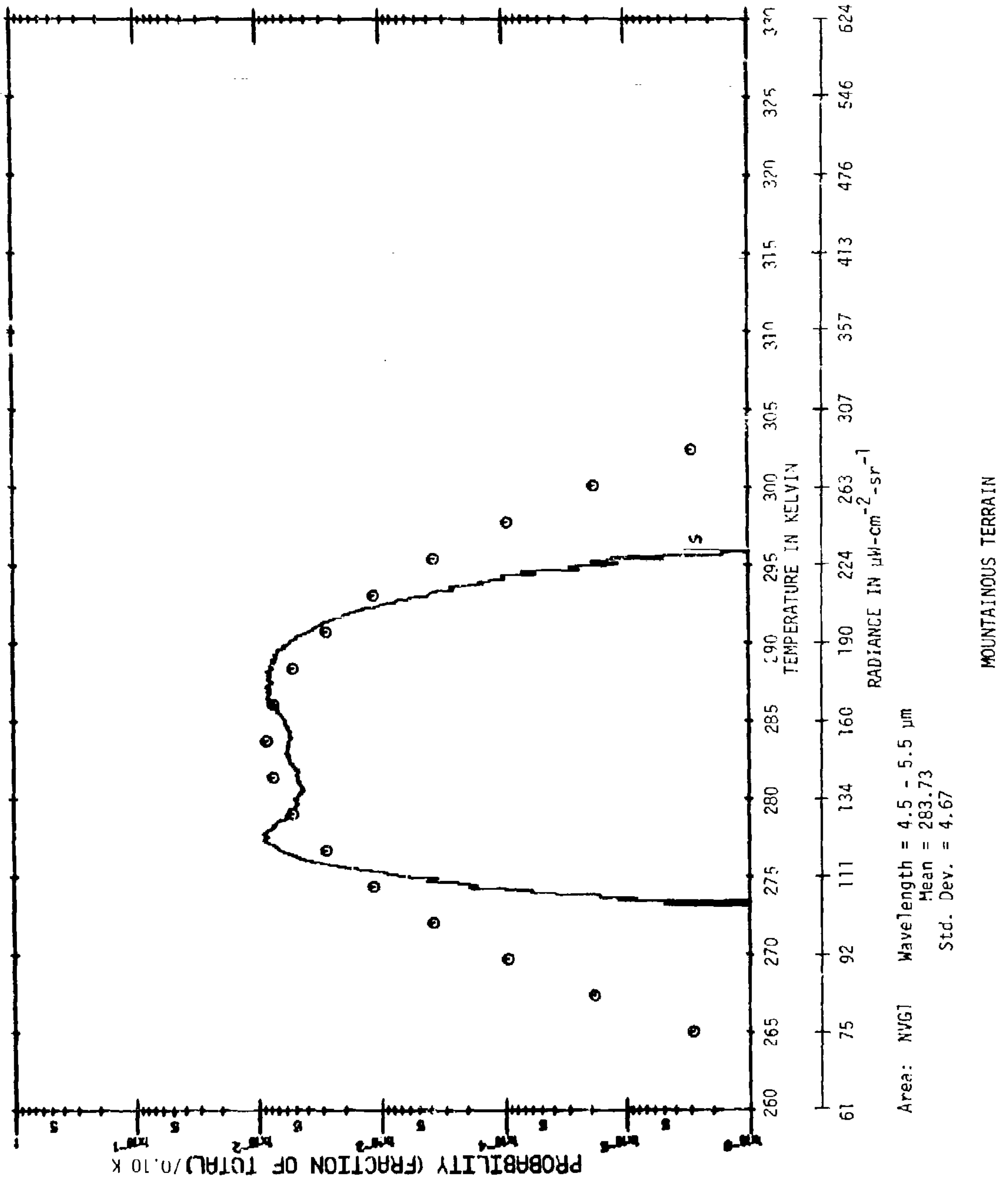
Area: NVG1 Wavelength = 3.0 - 4.2 μm
Mean = 291.12
Std. Dev. = 8.89

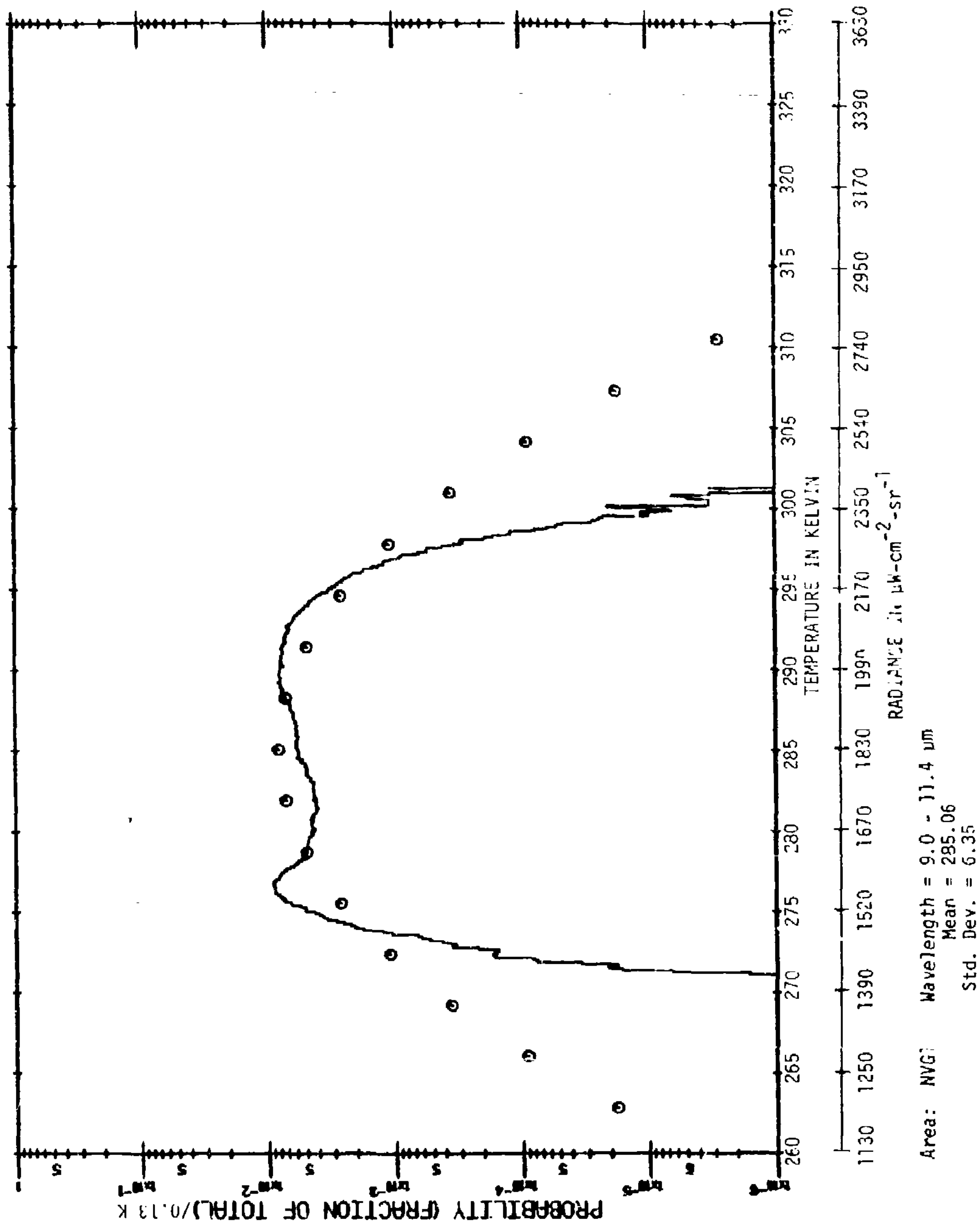
MOUNTAINOUS TERRAIN



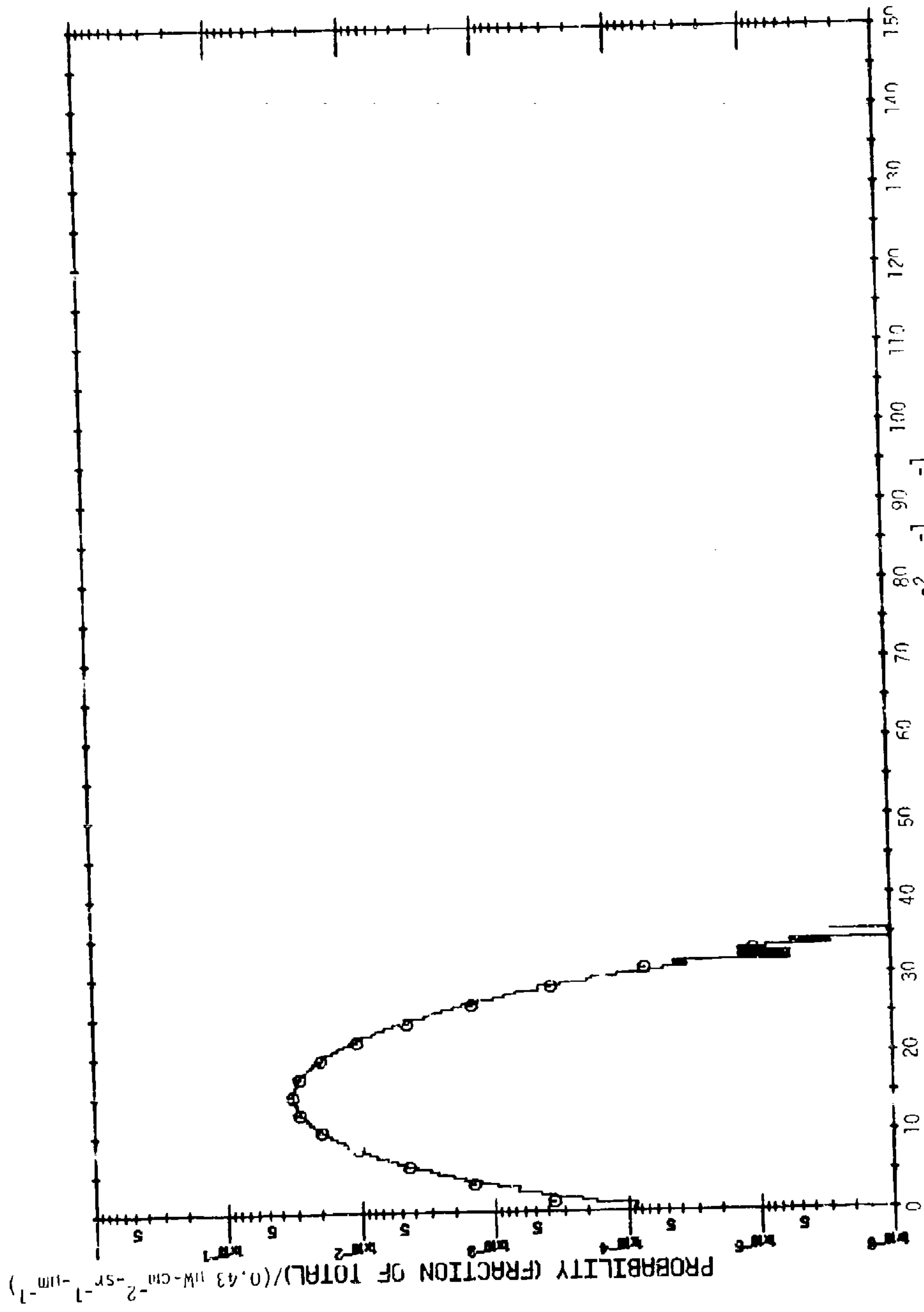
Area: NEVF Wavelength = 3.5 - 3.9 μm
Mean = 296.76
Std. Dev. = 9.94

MOUNTAINOUS TERRAIN


PROBABILITY (FRACTION OF TOTAL)/0.10 K
TEMPERATURE IN KELVIN
RADIANCE IN µW-cm^-2-sr^-1
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
61 75 92 111 134 160 190 224 263 307 357 413 476 546 624
Area: NVGI
Wavelength = 4.5 - 5.5 µm
Mean = 283.73
Std. Dev. = 4.67
MOUNTAINOUS TERRAIN

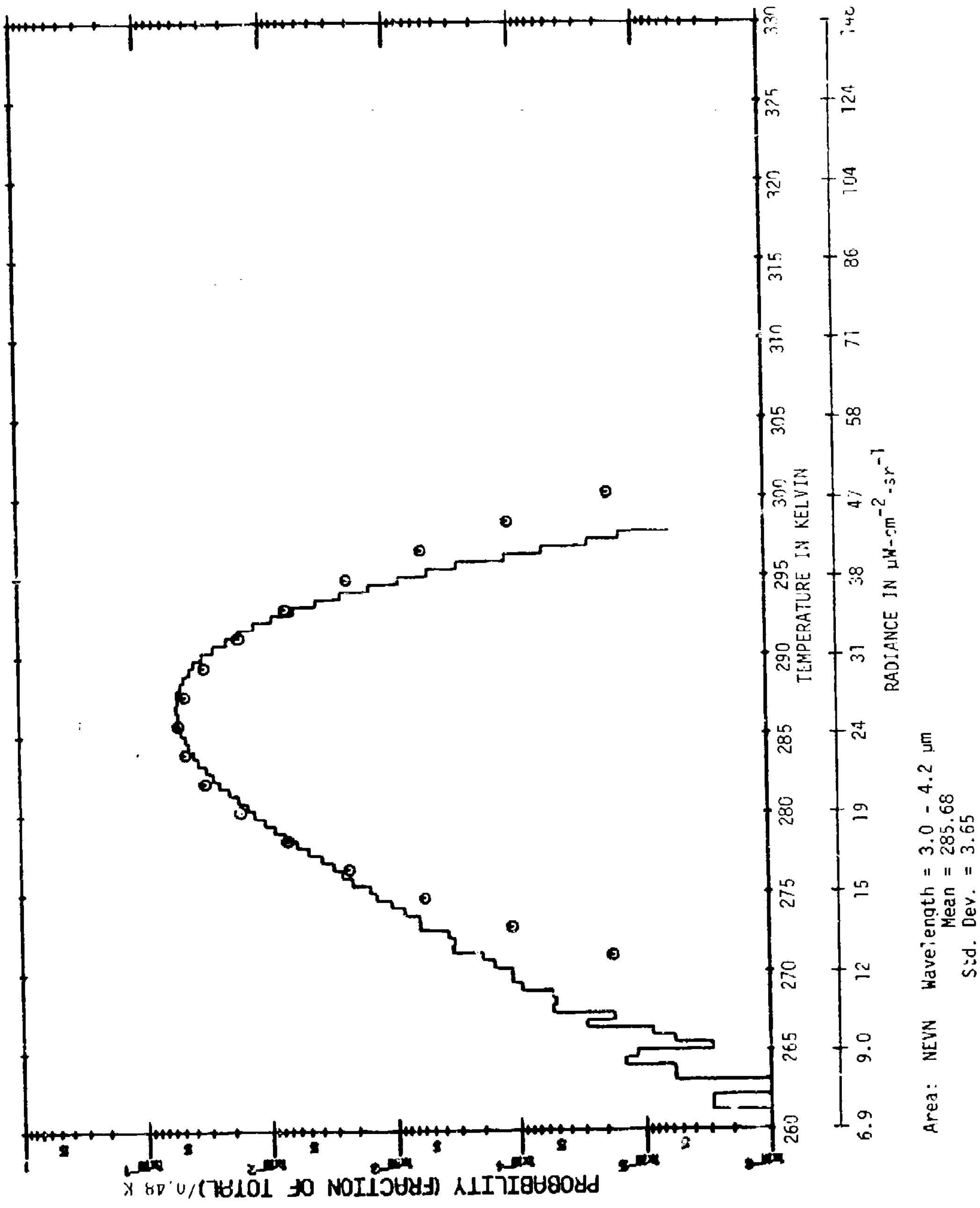


MOUNTAINOUS TERRAIN

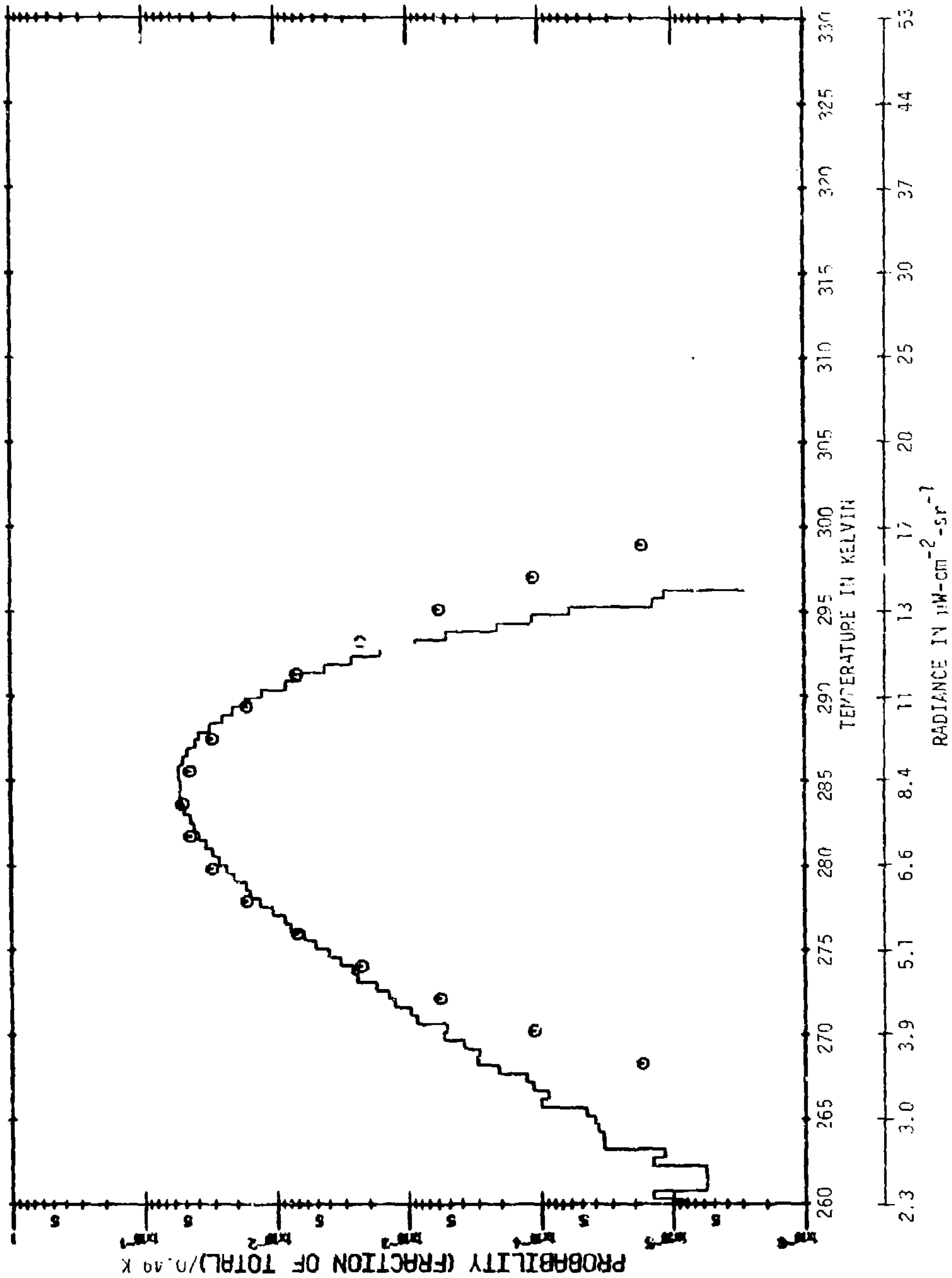


Area: NEVN Wavelength = 2.0 - 2.6 µm
Mean = 17.30
Std. Dev. = 5.28

MOUNTAINOUS TERRAIN

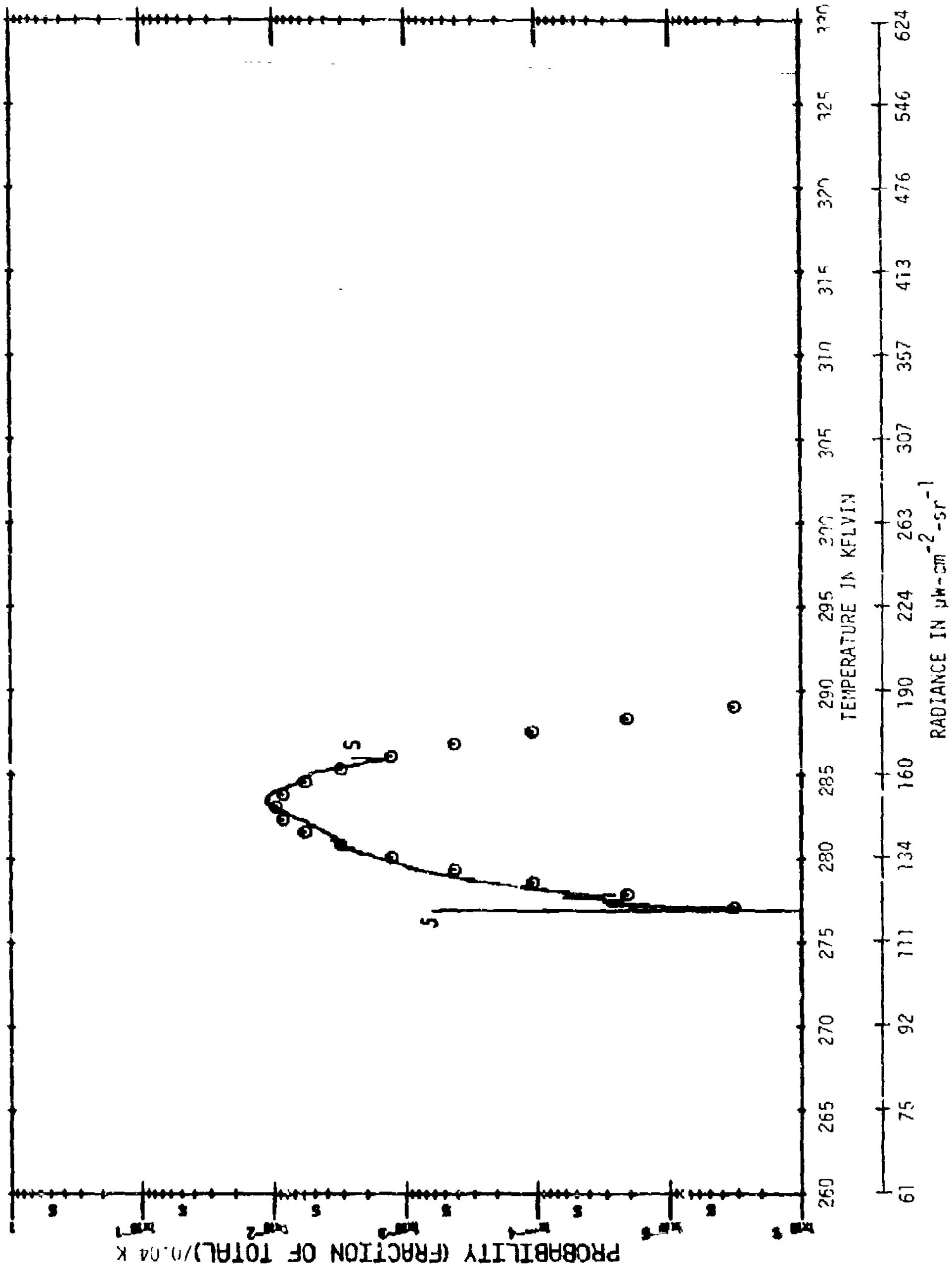


MOUNTAINOUS TERRAIN



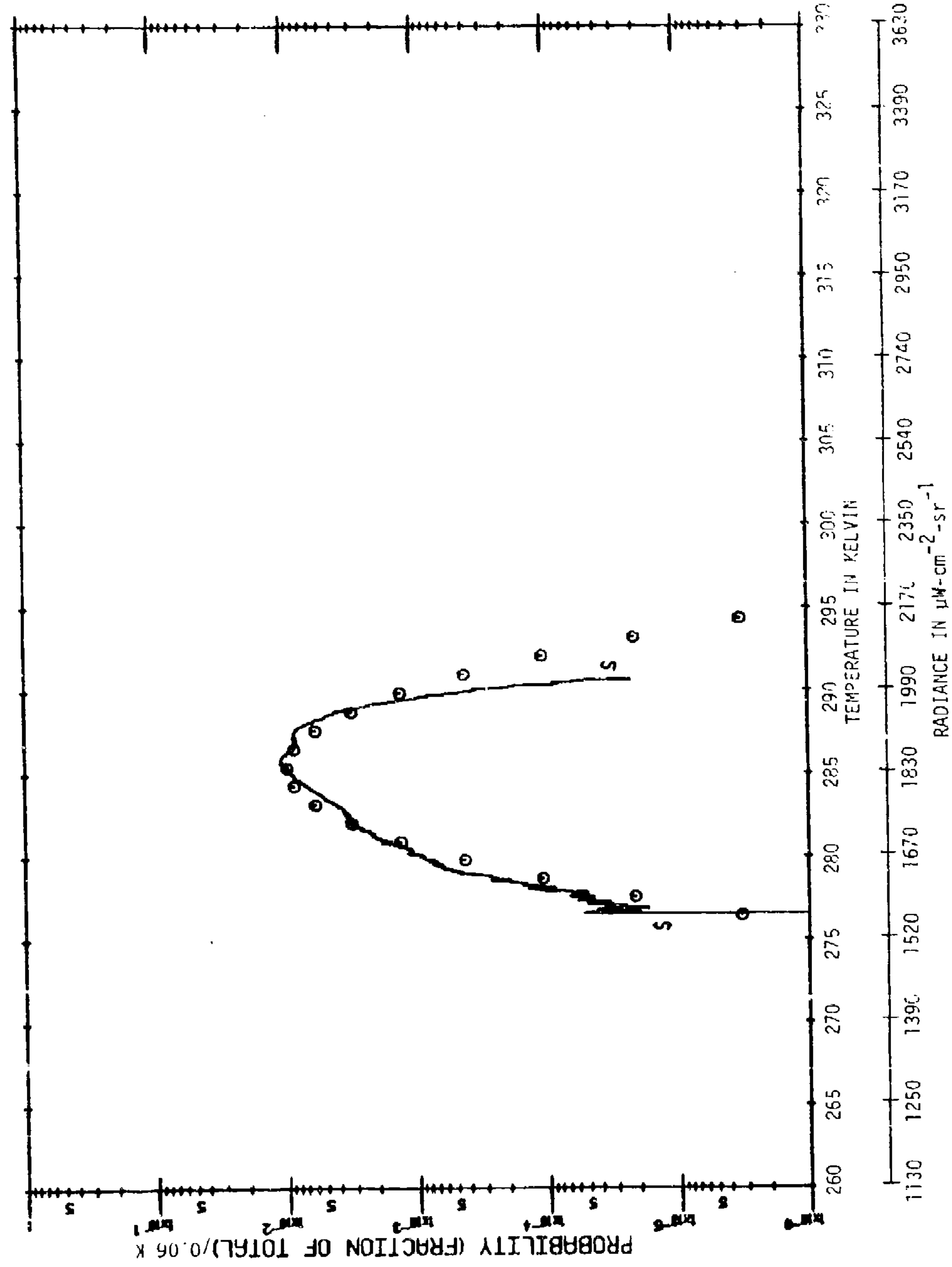
Area: NEVM Wavelength = 3.5 - 3.9 μm
Mean = 283.6
Std. Dev. = 3.82

MOUNTAINOUS TERRAIN



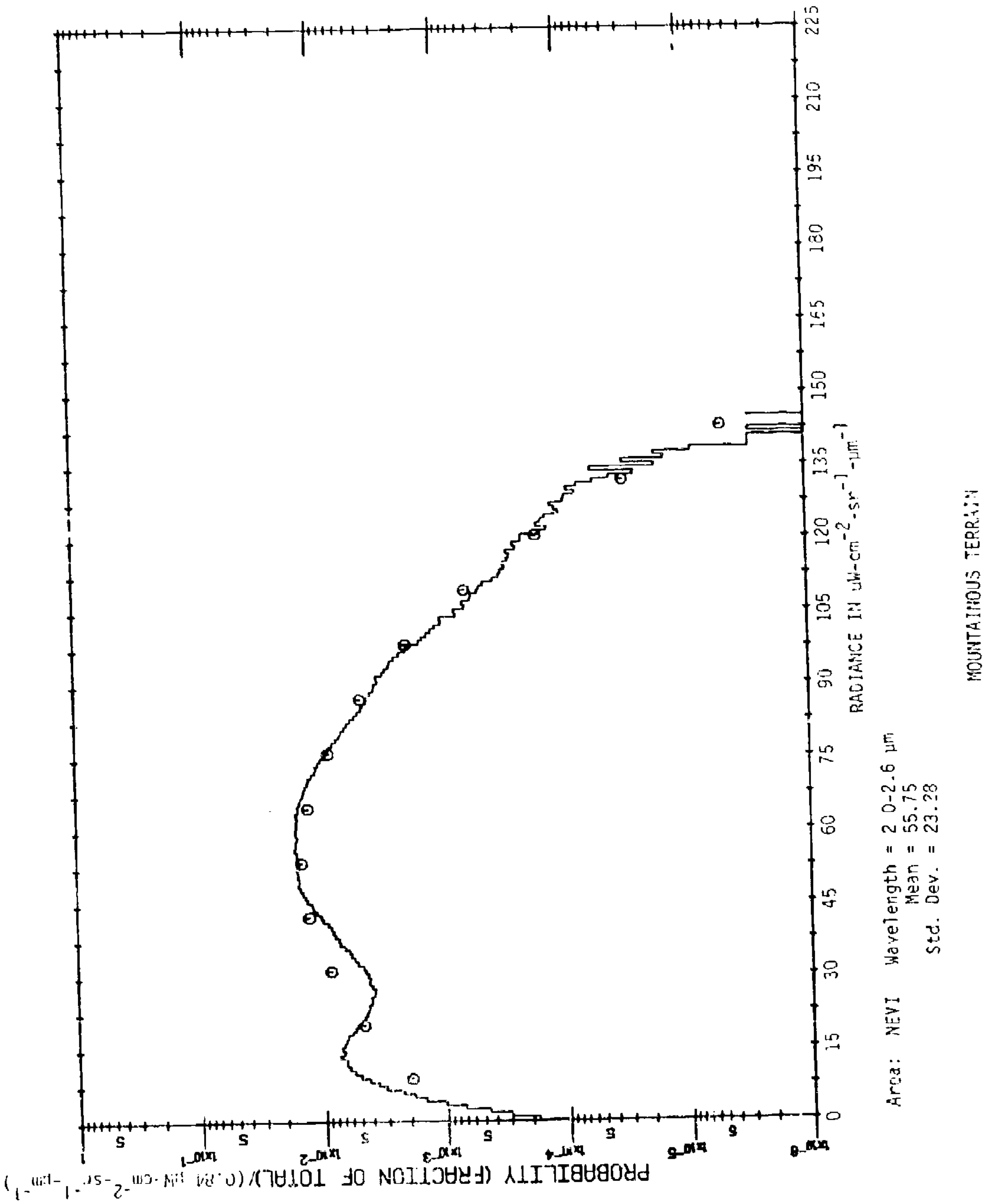
Area: NEVN Wavelength = 4.5 - 5.5 μm
Mean = 283.12
Std. Dev. = 1.50

MOUNTAINOUS TERRAIN

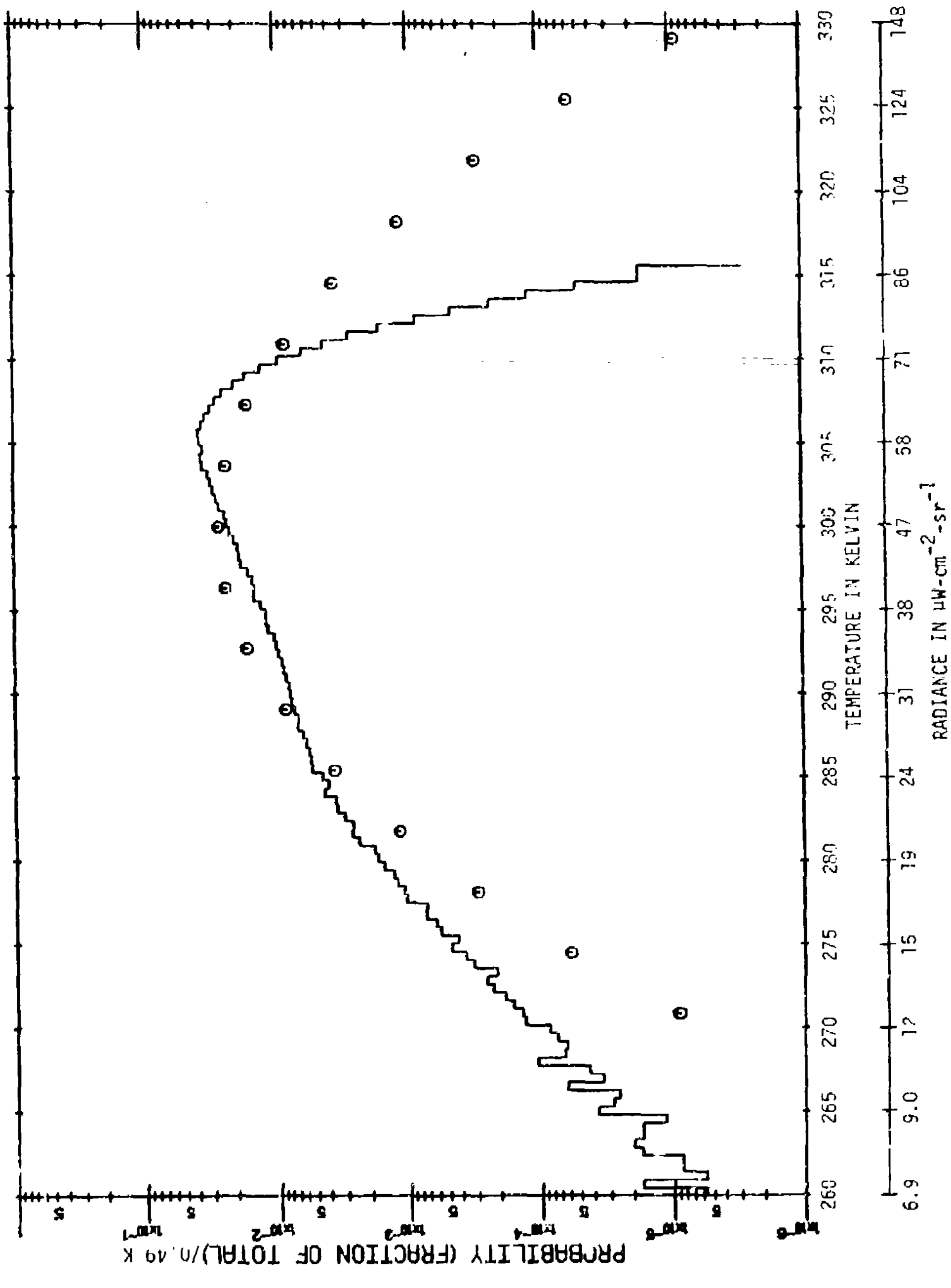


Area: NEVN Wavelength = 9.0 - 11.4 µm
Mean = 285.37
Std. Dev. = 2 23

MOUNTAINOUS TERRAIN

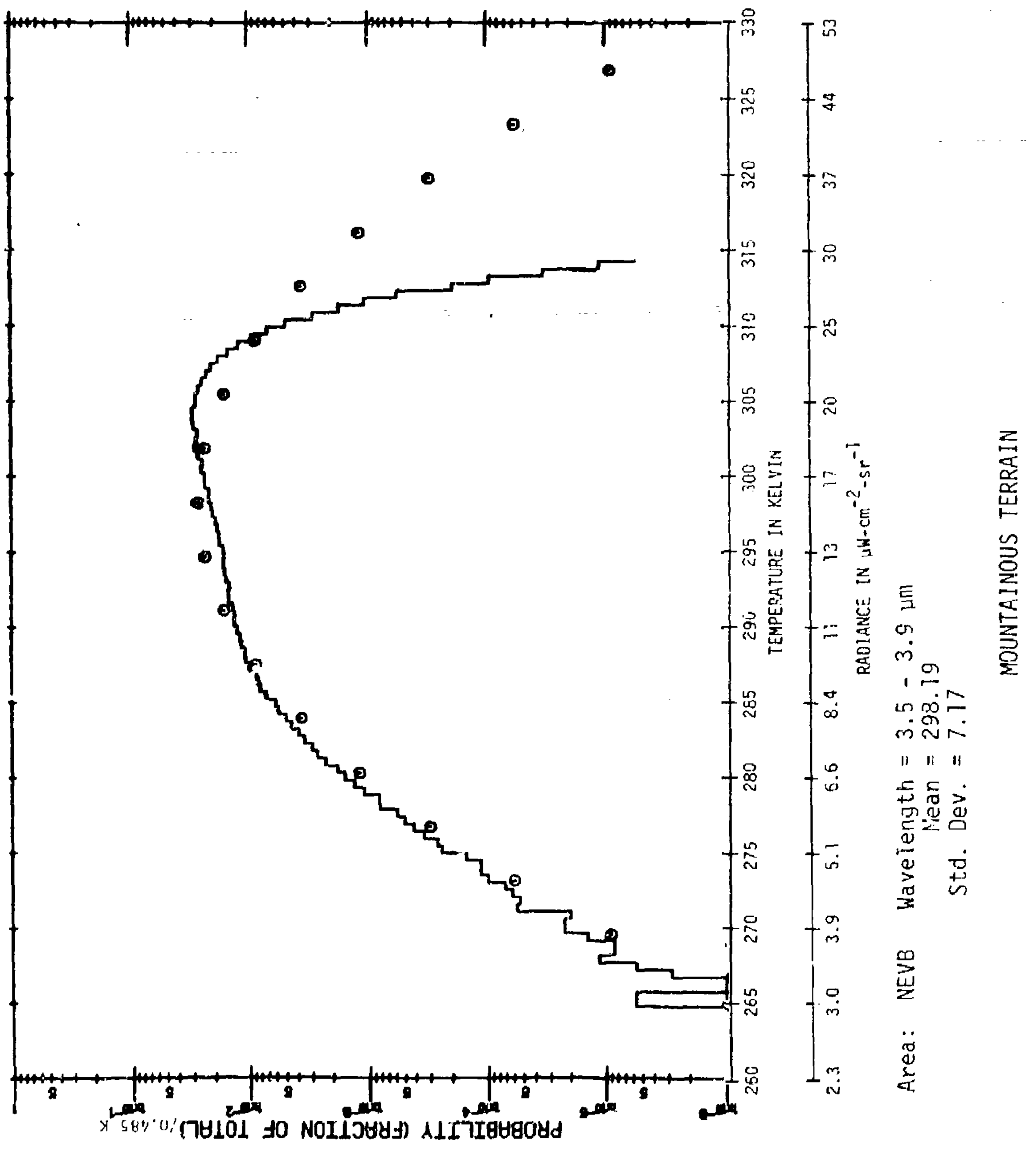


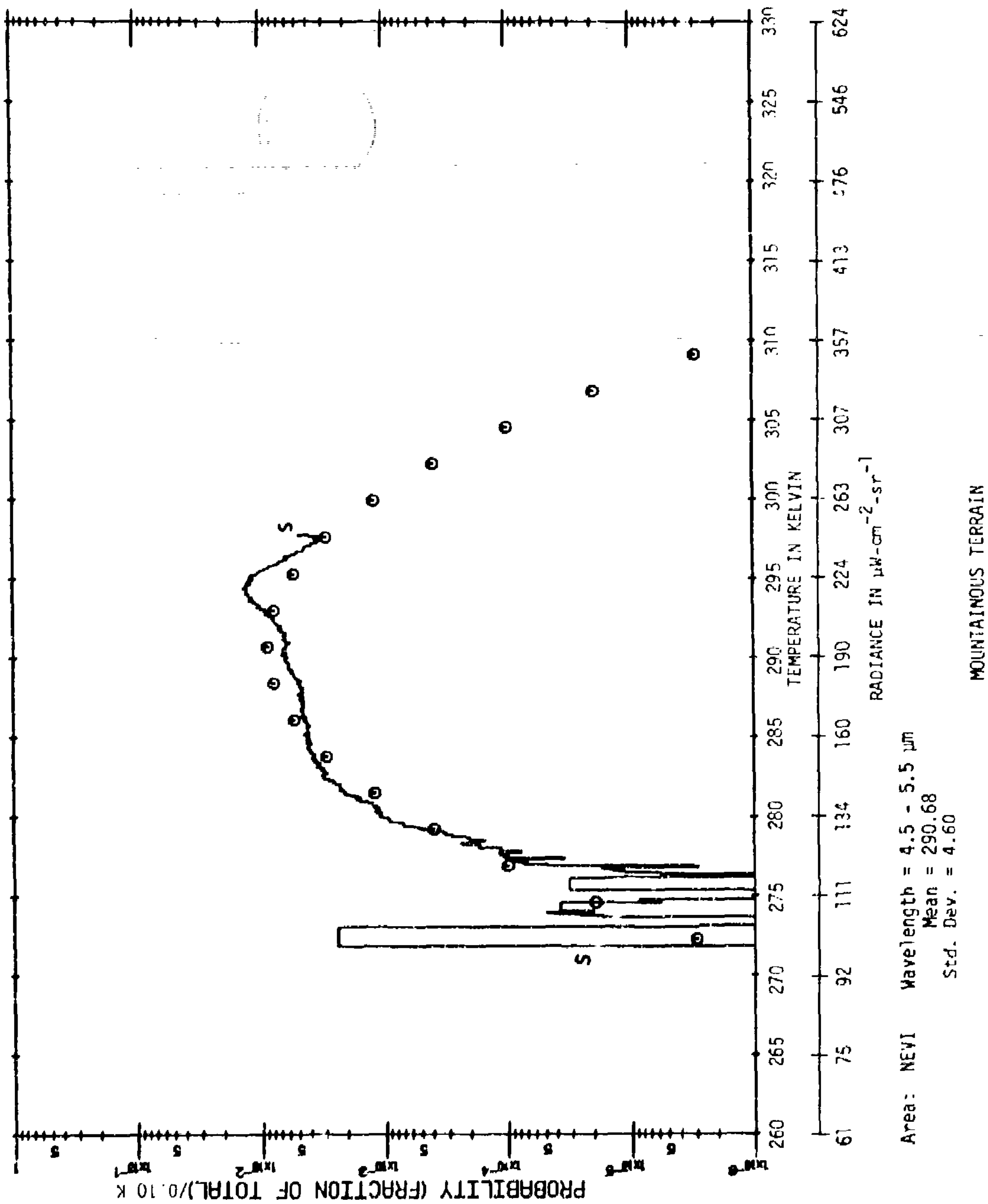
PROBABILITY (FRACTION OF TOTAL)/(0.04 μW-cm^{-2}-sr^{-1}-μm^{-1})
RADIANCE IN μW-cm^{-2}-sr^{-1}-μm^{-1}
0 15 30 45 60 75 90 105 120 135 150 165 180 195 210 225
Area: NEVI Wavelength = 2.0-2.6 μm
Mean = 55.75
Std. Dev. = 23.28
MOUNTAINOUS TERRAIN

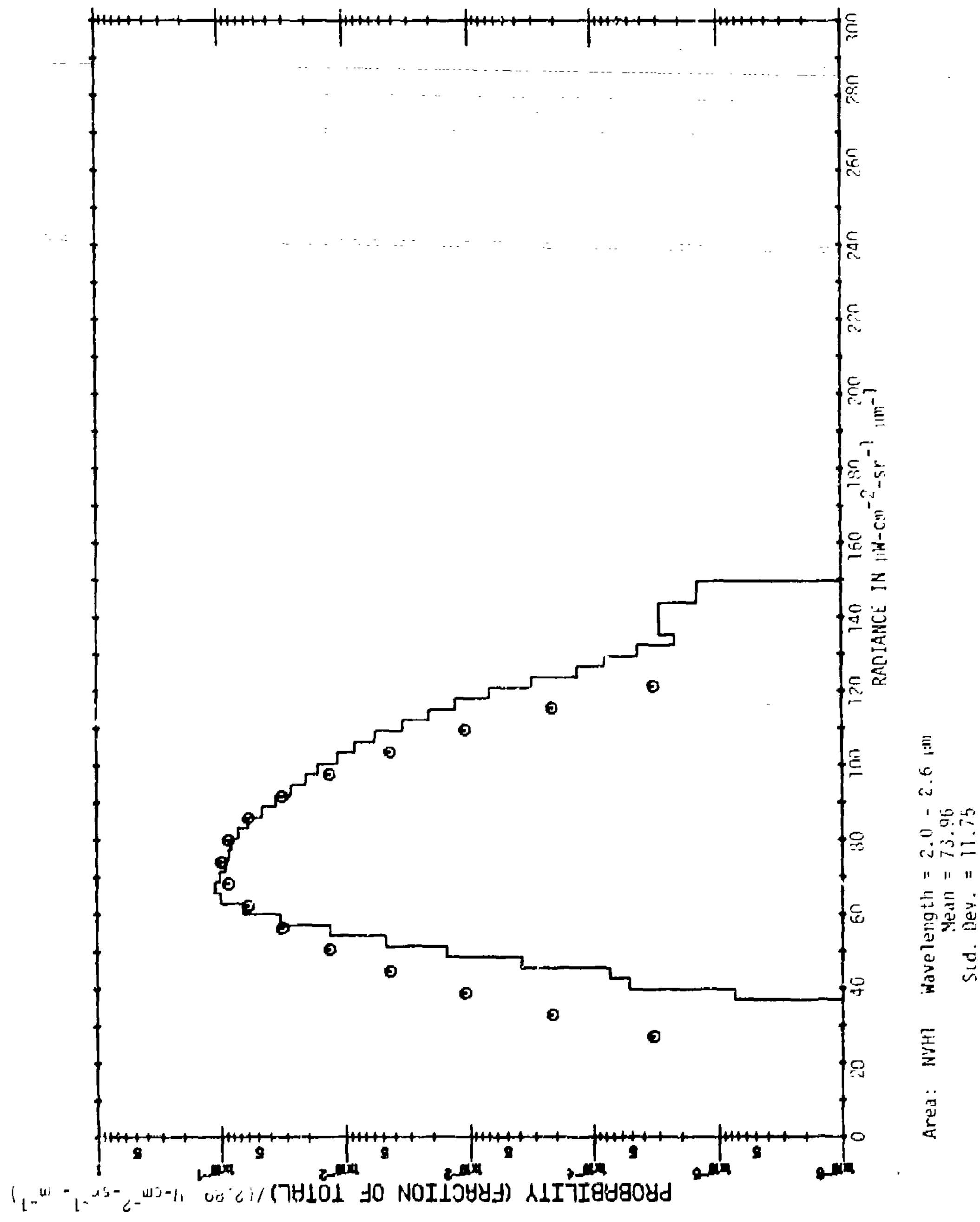


Area: NEVI Wavelength = 3.0 - 4.2 um
Mean = 300.00
Std. Dev. = 7.28

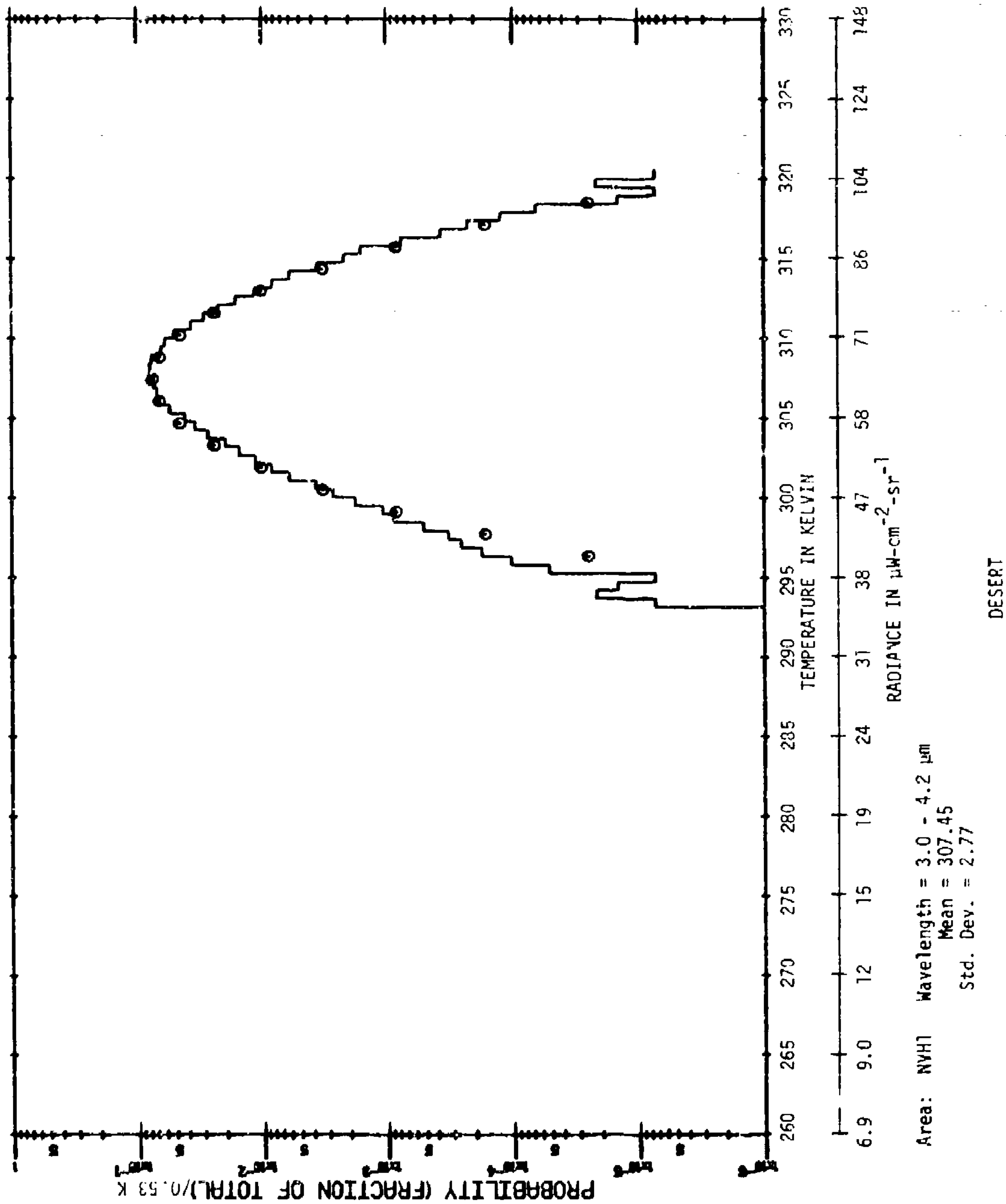
MOUNTAINOUS TERRAIN


PROBABILITY (FRACTION OF TOTAL)/0.485 K
TEMPERATURE IN KELVIN
250
265
270
275
280
285
290
295
300
305
310
315
320
325
330
RADIANCE IN μW-cm^{-2}-sr^{-1}
2.3
3.0
3.9
5.1
6.6
8.4
11
13
17
20
25
30
37
44
53
Area: NEVB Wavelength = 3.5 - 3.9 μm
Mean = 298.19
Std. Dev. = 7.17
MOUNTAINOUS TERRAIN

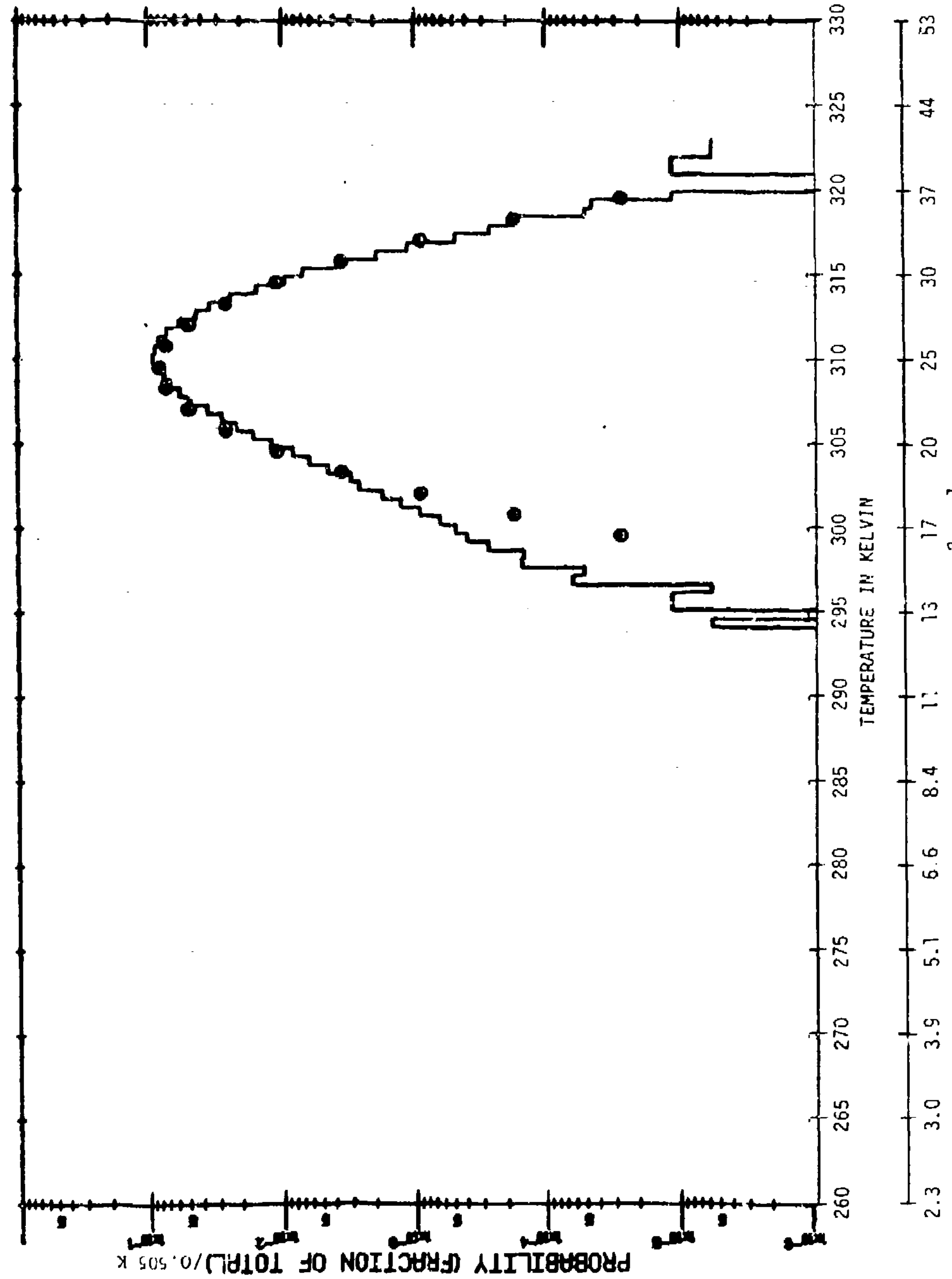

PROBABILITY (FRACTION OF TOTAL)/0.10 K
TEMPERATURE IN KELVIN
RADIANCE IN µW-cm^{-2}-sr^{-1}
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
61 75 92 111 134 160 190 224 263 307 357 413 476 546 624
Area: NEVI
Wavelength = 4.5 - 5.5 µm
Mean = 290.68
Std. Dev. = 4.60
MOUNTAINOUS TERRAIN


RADIANCE IN μW-cm^{-2}-sr^{-1} μm^{-1}
PROBABILITY (FRACTION OF TOTAL)
Area: NVH1 Wavelength = 2.0 - 2.6 μm
Mean = 73.96
Std. Dev. = 11.75
DESERT

ERIM

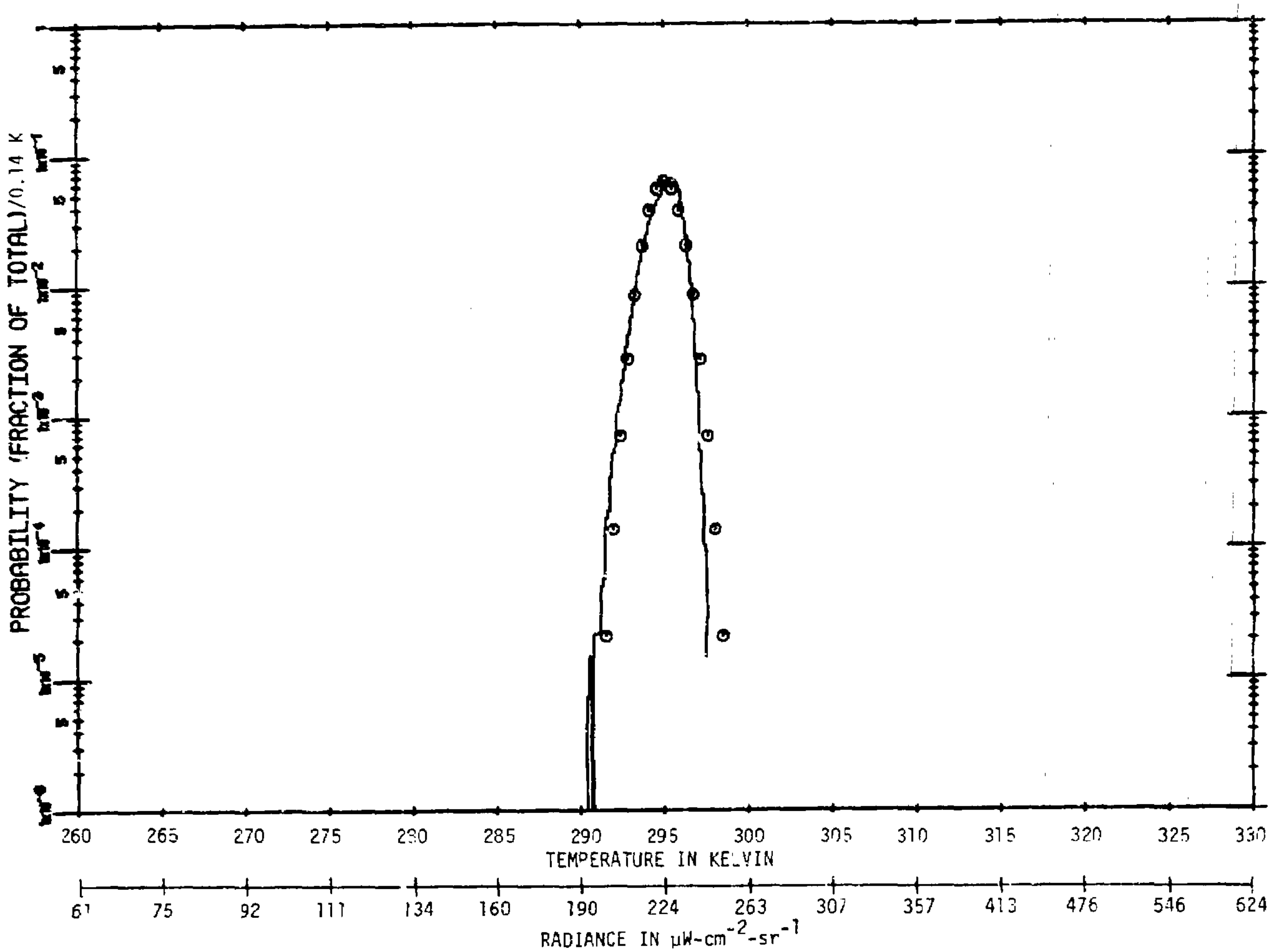


PROBABILITY (FRACTION OF TOTAL)/0.53 K
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
TEMPERATURE IN KELVIN
6.9 9.0 12 15 19 24 31 38 47 58 71 86 104 124 148
RADIANCE IN μW-cm-2-sr-1
Area: NVH1 Wavelength = 3.0 - 4.2 μm
Mean = 307.45
Std. Dev. = 2.77
DESERT



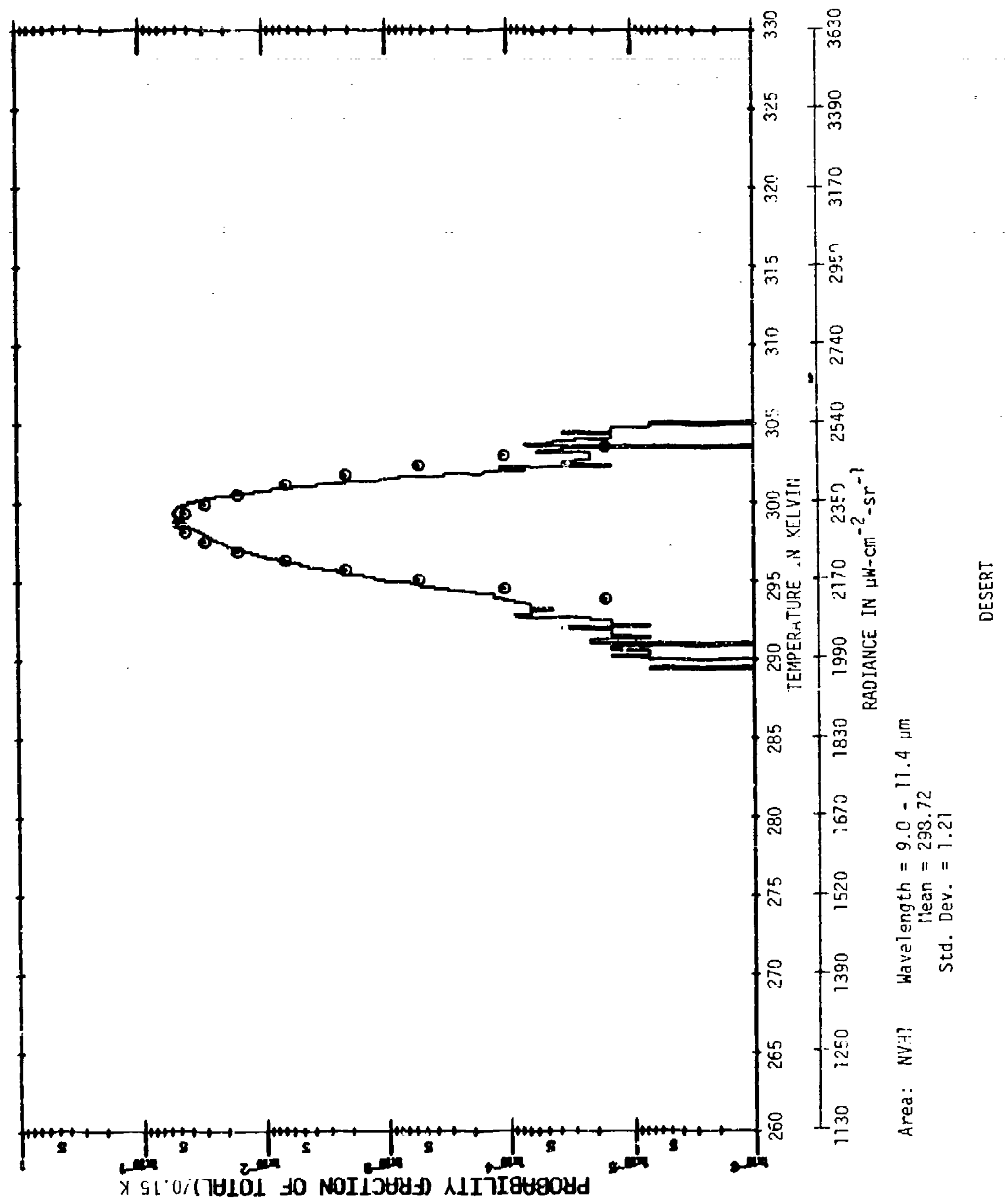
Area: NEVC1 Wavelength = 3.5 - 3.9 μm
Mean = 309.56
Std. Dev. = 2.49

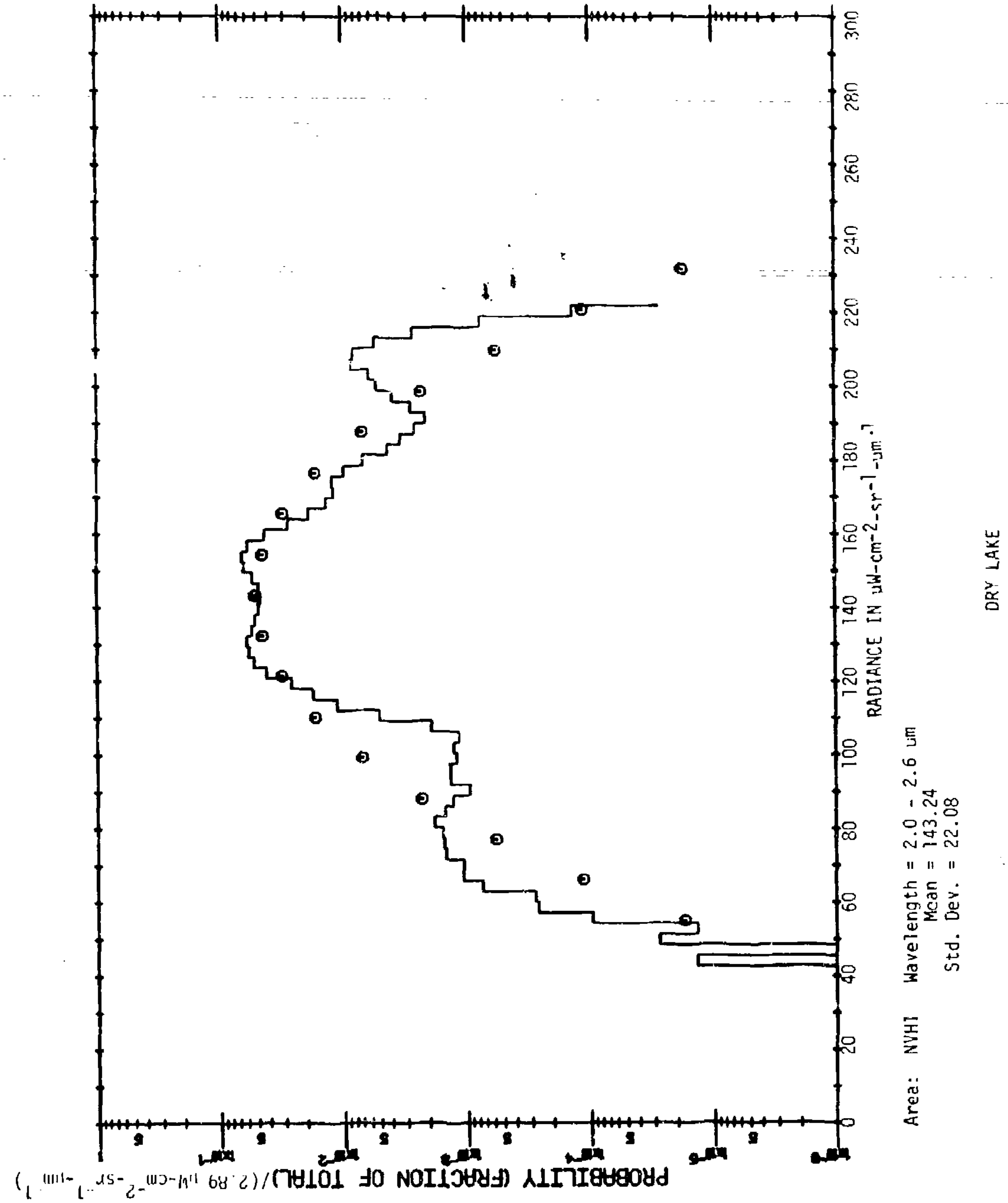
DESERT



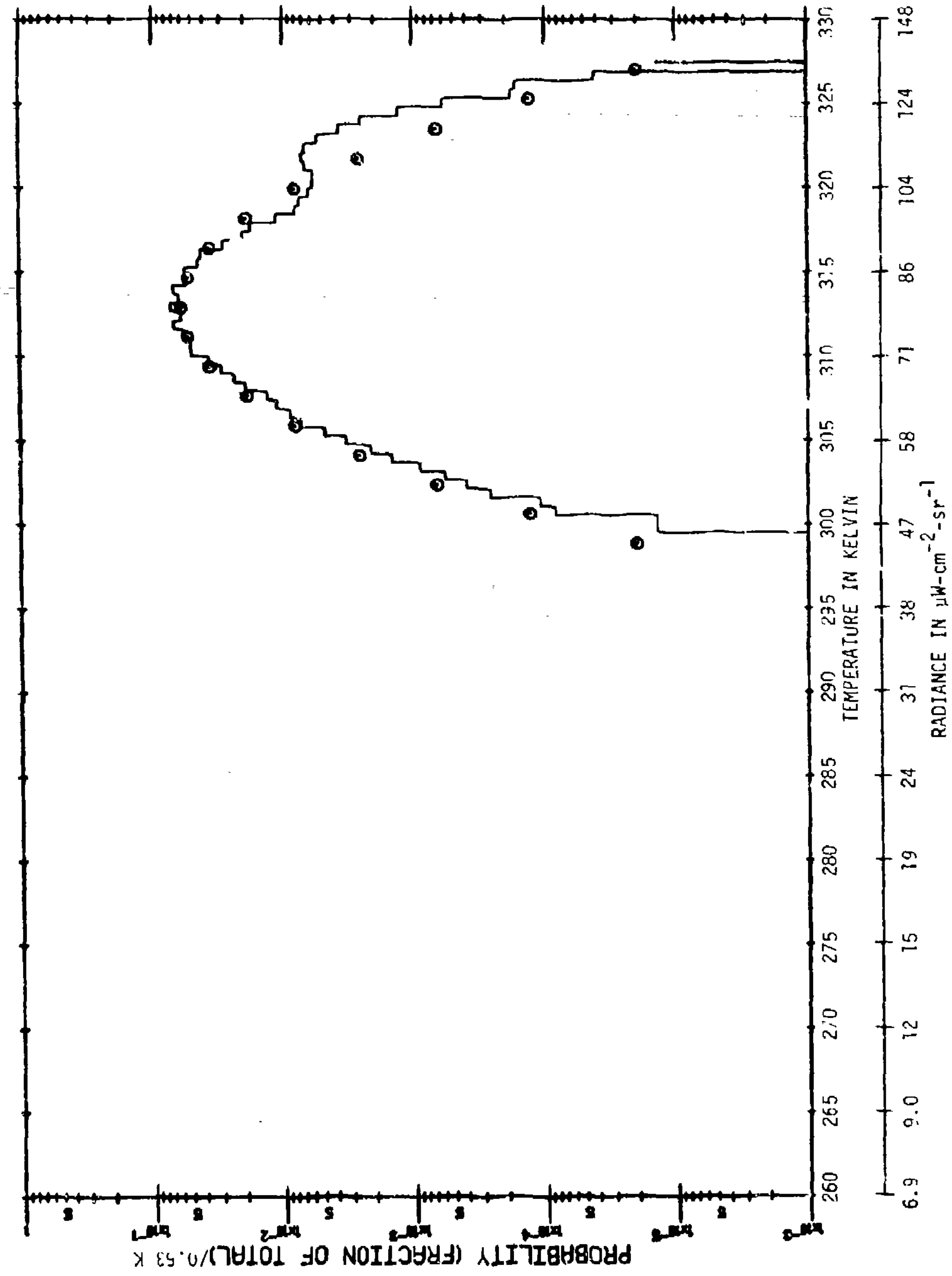
Area: NVH1 Wavelength = 4.5 - 5.5 μm
Mean = 295.02
Std. Dev. = 0.87

DESERT


PROBABILITY (FRACTION OF TOTAL)/0.15 K
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm^{-2}-sr^{-1}
1130 1250 1390 1520 1670 1830 1990 2170 2350 2540 2740 2950 3170 3390 3630
Area: NVH
Wavelength = 9.0 - 11.4 μm
Mean = 298.72
Std. Dev. = 1.21
DESERT

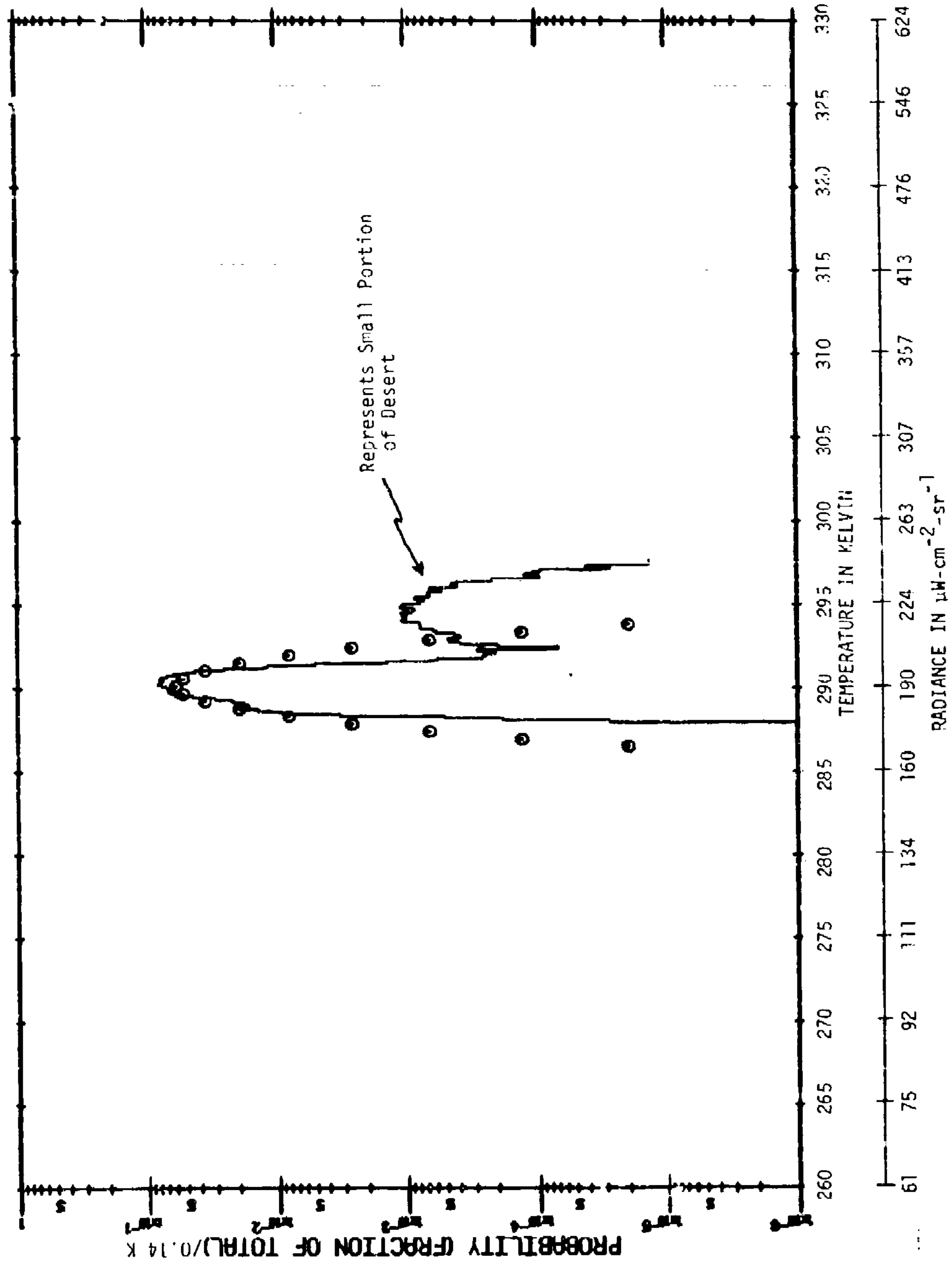


RADIANCE IN uW-cm-2-sr-1-um-1
PROBABILITY (FRACTION OF TOTAL)/(2.89 uW-cm-2-sr-1-um-1)
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
Area: NVHI Wavelength = 2.0 - 2.6 um
Mean = 143.24
Std. Dev. = 22.08
DRY LAKE



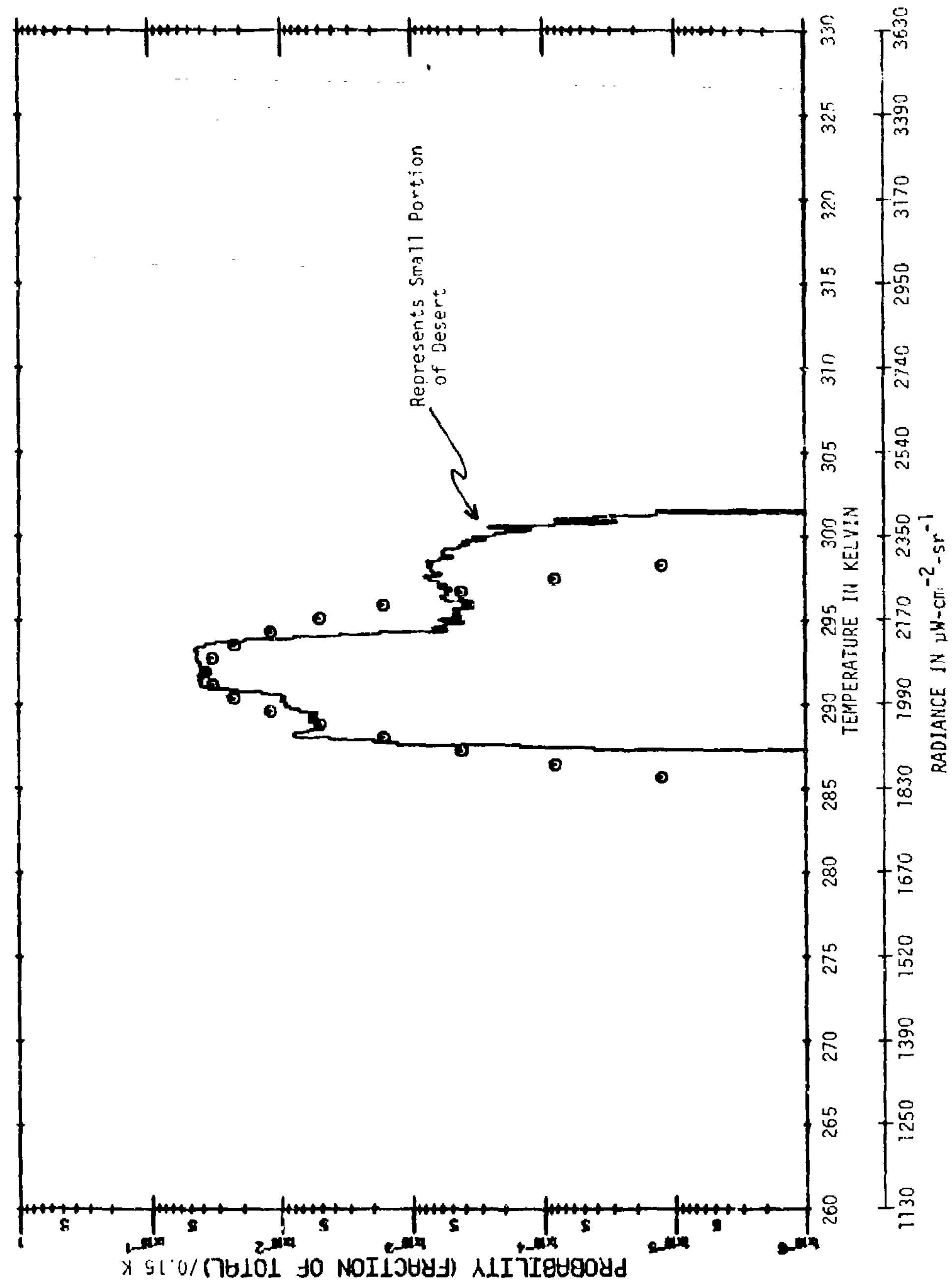
Area: NVHI Wavelength = 3.0 - 4.2 μm
Mean = 312.90
Std. Dev. = 3.52

DRY LAKE



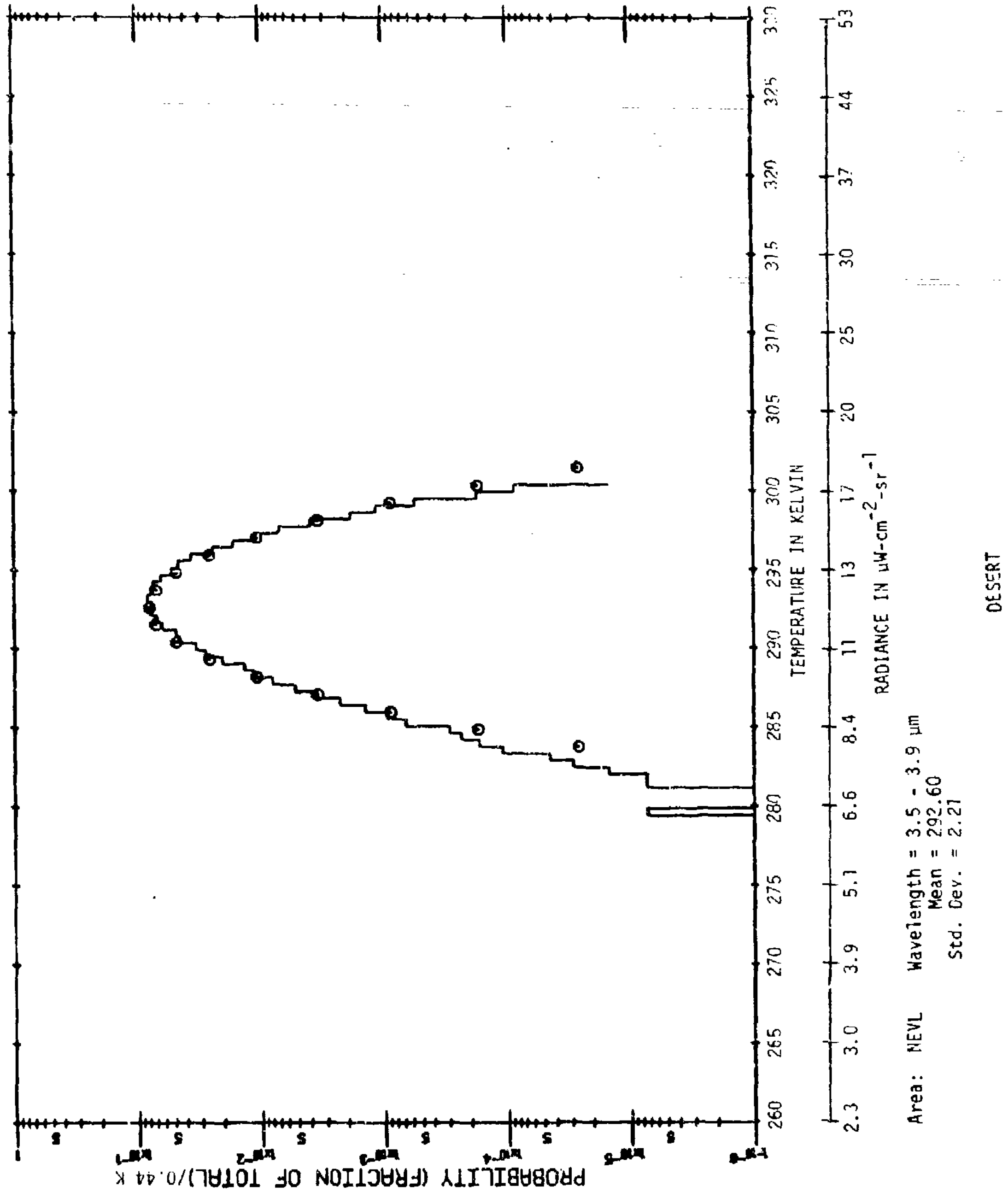
Area: NVH1 Wavelength = 4.5 - 5.5 μm
Mean = 290.16
Std. Dev. = 0.91

DRY LAKE

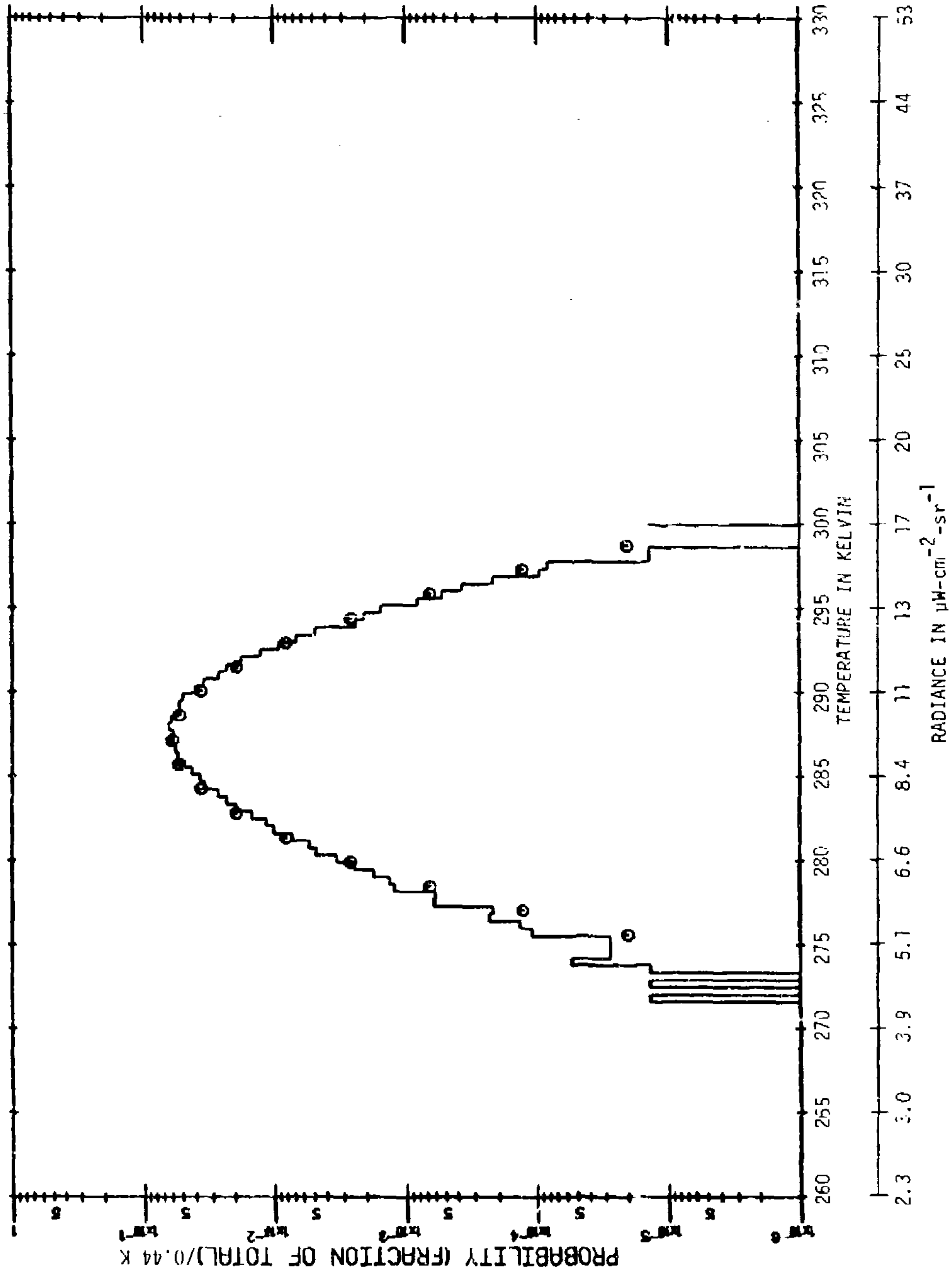


Area: NVH1 Wavelength = 9.0 - 11.4 μm
Mean = 291.94
Std. Dev. = 1.57

DRY LAKE


PROBABILITY (FRACTION OF TOTAL)/0.44 K
TEMPERATURE IN KELVIN
260 265 270 275 280 285 290 295 300 305 310 315 320 325 330
RADIANCE IN μW-cm-2-sr-1
2.3 3.0 3.9 5.1 6.6 8.4 11 13 17 20 25 30 37 44 53
Area: NEVL
Wavelength = 3.5 - 3.9 μm
Mean = 292.60
Std. Dev. = 2.21
DESERT

ERIM



Area: MEVL Wavelength = 3.5 - 3.9 μm
Mean = 287.11
Std Dev. = 2.89

DRY LAKE

NELLIS AFB, NEVADA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands: 2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)
3.0 - 4.2 μm (°K)
3.5 - 3.9 μm (°K)
4.5 - 5.5 μm (°K)
9.0 - 11.4 μm (°K)

*Because of the relatively small temperature changes in the scenery, there is a nearly linear relationship between the temperature and radiance statistics for the thermal channels. It is pertinent, therefore, to compute correlations between radiance and temperature channels.

MOUNTAINOUS TERRAIN

NEVB

Channel: 2 (3.5 - 3.9 μm)

Channel	2
Mean	2.9819E+02
St. Dev.	7.1665E+00
Total Points	355600

NEVF

Correlation Channels: 2 (3.5 - 3.9 μm)
6 (9.0 - 11.4 μm)

Correlation	2	6
2	1.000	
6	0.880	1.000

Channels	2	6
Mean	2.9676E+02	2.8708E+02
Std. Dev.	9.9428E+00	6.5334E+00
Total Points	355600	355600

NEVG1

Correlation Channels: 1 (2.0 - 2.6 μm)
2 (3.0 - 4.2 μm)
5 (4.5 - 5.5 μm)
7 (9.0 - 11.4 μm)

Correlation	1	2	5	7
1	1.000			
2	0.837	1.000		
5	0.793	0.894	1.000	
7	0.810	0.899	0.983	1.000

Channels	1	2	5	7
Mean	4.2120E+01	2.9112E+02	2.8373E+02	2.8506E+02
St. Dev.	2.3580E+01	8.8900E+00	4.6700E+00	6.3500E+00
Total Points	610400	610400	610400	610400

MOUNTAINOUS TERRAIN (Cont'd)

NEVI

Correlation Channels: 1 (2.0 - 2.6 μm)
2 (3.0 - 4.2 μm)
5 (4.5 - 5.5 μm)

Correlation	1	2	5
1	1.000		
2	0.740	1.000	
5	0.612	0.804	1.000

Channels	1	2	5
Mean	5.5750E+01	3.0000E+02	2.9068E+02
St. Dev.	2.3280E+01	7.2800E+00	4.6000E+00
Total Points	349600	349600	349600

NEVM

Channel: 3 (3.5 - 3.9 μm)

Channel	3
Mean	2.8360E+02
St. Dev.	3.8200E+02
Total Points	349600

NEVN

Correlation Channels: 1 (2.0 - 2.6 μm)
2 (3.0 - 4.2 μm)
5 (4.5 - 5.5 μm)
7 (9.0 - 11.4 μm)

Correlation	1	2	5	7
1	1.000			
2	0.255	1.000		
5	0.413	0.539	1.000	
7	0.398	0.565	0.910	1.000

Channels	1	2	5	7
Mean	1.7300E+01	2.8568E+02	2.8312E+02	2.8537E+02
St. Dev.	5.2800E+00	3.6500E+00	1.5000E+00	2.2300E+00
Total Points	349600	349600	349600	349600

DESERT (including Dry Lake)

NEVC1

Correlation Channels: 2 (3.5 - 3.9 μm)
6 (9.0 - 11.4 μm)

Correlation	2	6
2	1.000	
6	0.335	1.000

Channels	2	6
Mean	3.0956E+02	2.9875E+02
St. Dev.	2.4900E+00	1.3500E+00
Total Points	176400	176400

NEVH1

Correlation Channels: 1 (2.0 - 2.6 μm)
2 (3.0 - 4.2 μm)
5 (4.5 - 5.5 μm)
7 (9.0 - 11.4 μm)

Desert

Correlation	1	2	5	7
1	1.000			
2	0.408	1.000		
5	0.015	0.188	1.000	
7	-0.001	0.102	0.584	1.000

Channels	1	2	5	7
Mean	7.3960E+01	3.0745E+02	2.9502E+02	2.9872E+02
St. Dev.	1.1750E+01	2.7700E+00	0.8700E+00	1.2100E+00
Total Points	349600	349600	349600	349600

DESERT (including Dry Lake) (Cont'd)

NEVH1 (Cont'd)

Dry Lake

Correlation	1	2	5	7
1	1.000			
2	0.737	1.000		
5	-0.830	-0.487	1.000	
7	-0.935	-0.690	0.902	1.000

Channels	1	2	5	7
Mean	1.4324E+02	3.1290E+02	2.9016E+02	2.9194E+02
St. Dev.	2.2090E+01	3.5200E+00	0.9100E+00	1.5700E+00
Total Points	72400	72400	72400	72400

NEVL

Channel: 3 (3.5 - 3.9 μm)

Desert

Channel	3
Mean	2.9260E+02
St. Dev.	2.2100E+00
Total Points	136400

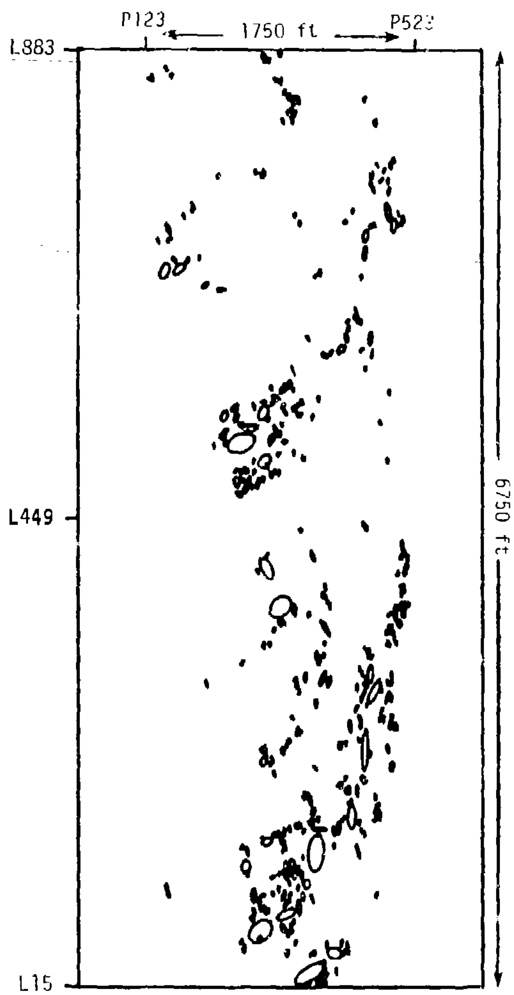
Dry Lake

Channel	3
Mean	2.8711E+02
St. Dev.	2.8900E+00
Total Points	72400

NELLIS AFB, NEVADA

Ellipse Statistics

Spectral Bands: 2.0 - 2.6 μm
3.0 - 4.2 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: NEVN (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 1.50 σ

Mean = 17.30 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 5.28 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

ΣERIM

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 2.0 - 2.6 μm

Mean = 17.30 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 5.28 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	286
10.0	TO	15.0	126
15.0	TO	20.0	141
20.0	TO	25.0	69
25.0	TO	30.0	26
30.0	TO	35.0	40
35.0	TO	40.0	7
40.0	TO	45.0	19
45.0	TO	50.0	18
50.0	TO	75.0	38
75.0	TO	100.0	18
100.0	TO	150.0	18
150.0	TO	200.0	13
200.0	TO	250.0	6
250.0	TO	300.0	2
300.0	TO	400.0	5
400.0	TO	500.0	2
	OVER	500.0	12

TOTAL NUMBER OF ELLIPTICAL AREAS = 846

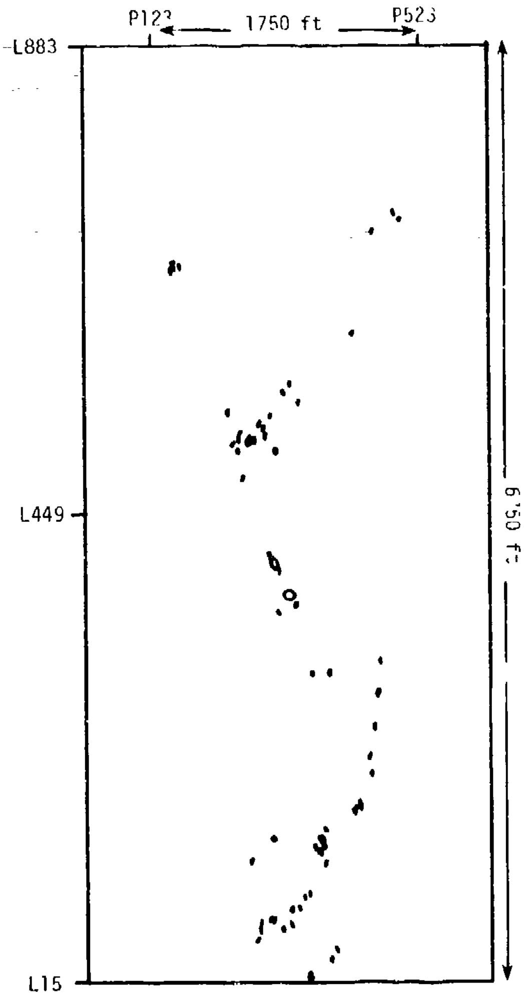
3248 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	13
14	TO	15	45	TO	52	92
16	TO	17	52	TO	55	47
17	TO	20	55	TO	65	172
20	TO	22	65	TO	72	86
22	TO	24	72	TO	78	22
24	TO	26	78	TO	85	19
26	TO	28	85	TO	91	48
28	TO	30	91	TO	98	29
30	TO	32	98	TO	104	28
32	TO	39	104	TO	127	53
39	TO	45	127	TO	147	38
45	TO	55	147	TO	180	45
55	TO	71	180	TO	232	36
71	TO	100	232	TO	328	40
	OVER	100		OVER	328	78

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	18
1.2	TO	1.3	4
1.3	TO	1.4	111
1.4	TO	1.5	5
1.5	TO	1.6	127
1.6	TO	1.7	20
1.7	TO	1.8	145
1.8	TO	1.9	19
1.9	TO	2.0	52
2.0	TO	2.4	145
2.4	TO	2.6	45
2.6	TO	2.8	7
2.8	TO	3.0	22
3.0	TO	3.5	34
3.5	TO	4.0	19
4.0	TO	4.5	18
	OVER	4.5	31



Area: NEVN (Wavelength = 2.0 - 2.6 μm)
Radiance Threshold = Mean + 2.50 σ
Mean = 17.30 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 5.28 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50

Wavelength = 2.0 - 2.6 μm

Mean = 17.30 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 5.28 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	69
10.0	TO	15.0	45
15.0	TO	20.0	36
20.0	TO	25.0	21
25.0	TO	30.0	2
30.0	TO	35.0	8
35.0	TO	40.0	2
40.0	TO	45.0	3
45.0	TO	50.0	3
50.0	TO	75.0	4
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 196

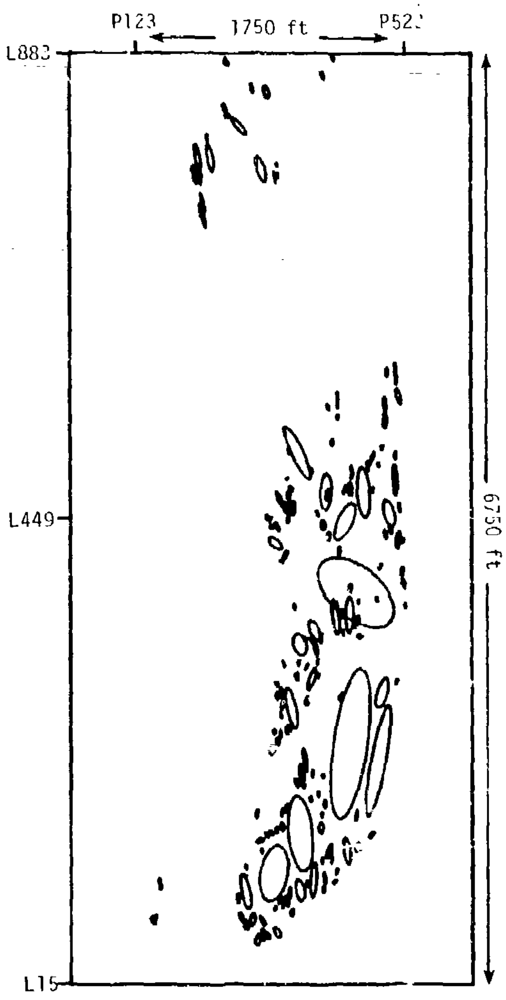
1089 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	4
14	TO	16	45	TO	52	19
16	TO	17	52	TO	55	13
17	TO	20	55	TO	65	42
20	TO	22	65	TO	72	29
22	TO	24	72	TO	78	10
24	TO	26	78	TO	85	4
26	TO	28	85	TO	91	16
28	TO	30	91	TO	98	7
30	TO	32	98	TO	104	9
32	TO	39	104	TO	127	11
39	TO	45	127	TO	147	9
45	TO	55	147	TO	180	8
55	TO	71	180	TO	232	8
71	TO	100	232	TO	328	4
OVER		100	OVER		328	3

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	6
1.2	TO	1.3	0
1.3	TO	1.4	23
1.4	TO	1.5	1
1.5	TO	1.6	29
1.6	TO	1.7	9
1.7	TO	1.8	44
1.8	TO	1.9	2
1.9	TO	2.0	16
2.0	TO	2.4	47
2.4	TO	2.6	6
2.6	TO	2.8	3
2.8	TO	3.0	5
3.0	TO	3.5	2
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	2



Area: NEVN (Wavelength = 4.5 - 5.5 μm)
Temperature Thresho.d = Mean + 1.50 σ
Mean = 283.12 Kelvin
Std. Dev. = σ = 1.50 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 283.12 Kelvin

σ = 1.50 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	66
10.0	TO	15.0	50
15.0	TO	20.0	44
20.0	TO	25.0	25
25.0	TO	30.0	13
30.0	TO	35.0	13
35.0	TO	40.0	3
40.0	TO	45.0	5
45.0	TO	50.0	8
50.0	TO	75.0	17
75.0	TO	100.0	11
100.0	TO	150.0	18
150.0	TO	200.0	7
200.0	TO	250.0	8
250.0	TO	300.0	1
300.0	TO	400.0	2
400.0	TO	500.0	5
	OVER	500.0	22

TOTAL NUMBER OF ELLIPTICAL AREAS = 318

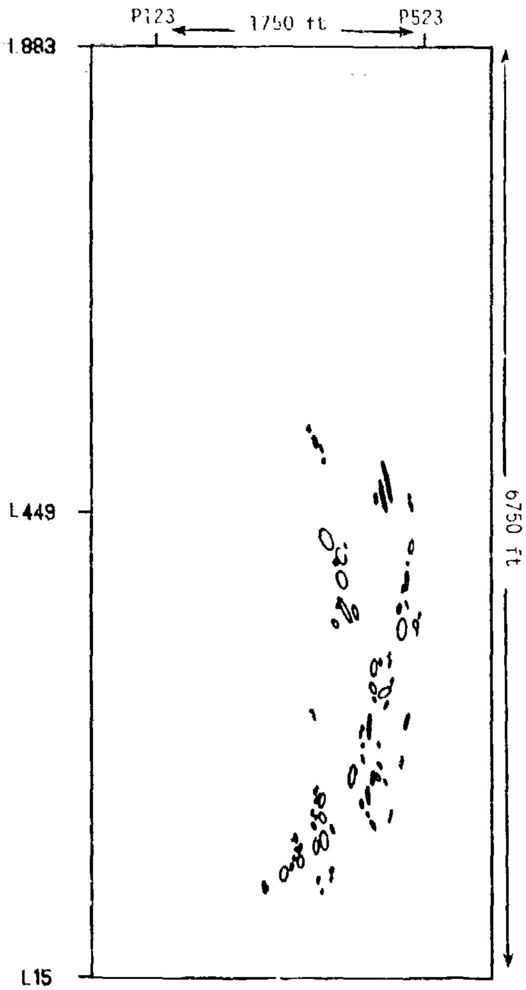
539 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	3
14 TO 16	45 TO 52	28
16 TO 17	52 TO 55	19
17 TO 20	55 TO 65	46
20 TO 22	65 TO 72	21
22 TO 24	72 TO 78	12
24 TO 26	78 TO 85	3
26 TO 28	85 TO 91	22
28 TO 30	91 TO 98	11
30 TO 32	98 TO 104	9
32 TO 39	104 TO 127	24
39 TO 45	127 TO 147	13
45 TO 55	147 TO 180	13
55 TO 71	180 TO 232	21
71 TO 100	232 TO 328	19
OVER 100	OVER 328	54

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	7
1.2 TO 1.3	3
1.3 TO 1.4	32
1.4 TO 1.5	4
1.5 TO 1.6	55
1.6 TO 1.7	8
1.7 TO 1.8	40
1.8 TO 1.9	12
1.9 TO 2.0	21
2.0 TO 2.4	64
2.4 TO 2.6	10
2.6 TO 2.8	6
2.8 TO 3.0	4
3.0 TO 3.5	19
3.5 TO 4.0	9
4.0 TO 4.5	9
OVER 4.5	15



Area: NEVN (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 1.80 σ

Mean = 283.12 Kelvin

Std. Dev. = σ = 1.50 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

ERIM

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.80 σ

Wavelength = 4.5 - 5.5 μm

Mean = 283.12 Kelvin

σ = 1.50 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	23
10.0 TO 15.0	13
15.0 TO 20.0	15
20.0 TO 25.0	10
25.0 TO 30.0	5
30.0 TO 35.0	6
35.0 TO 40.0	3
40.0 TO 45.0	8
45.0 TO 50.0	1
50.0 TO 75.0	10
75.0 TO 100.0	5
100.0 TO 150.0	4
150.0 TO 200.0	6
200.0 TO 250.0	5
250.0 TO 300.0	1
300.0 TO 400.0	5
400.0 TO 500.0	3
OVER 500.0	5

TOTAL NUMBER OF HOT SPOT = 128

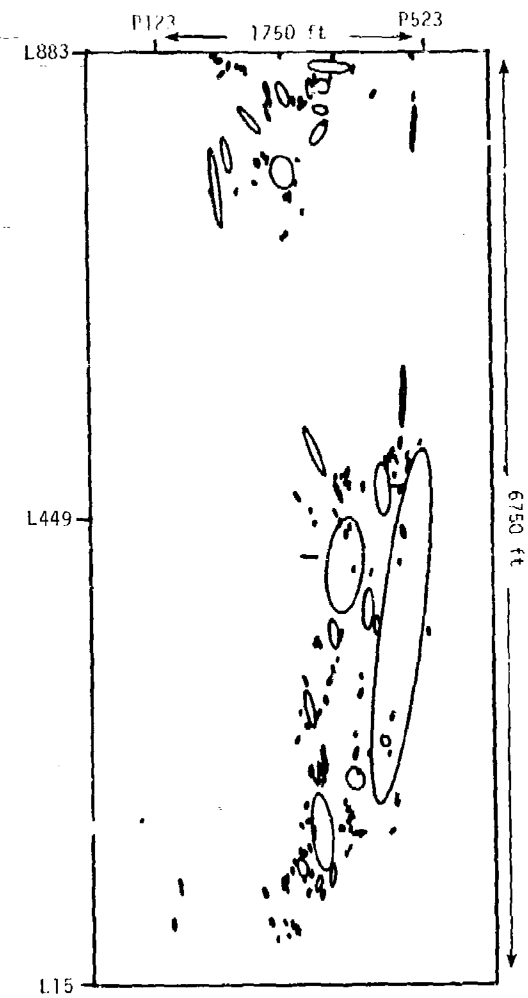
260 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	7
16 TO 17	52 TO 55	9
17 TO 20	55 TO 65	14
20 TO 22	65 TO 72	7
22 TO 24	72 TO 78	1
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	7
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	4
32 TO 39	104 TO 127	9
39 TO 45	127 TO 147	8
45 TO 55	147 TO 180	8
55 TO 71	180 TO 232	8
71 TO 100	232 TO 328	7
OVER 100	OVER 328	34

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	0
1.3 TO 1.4	8
1.4 TO 1.5	0
1.5 TO 1.6	18
1.6 TO 1.7	2
1.7 TO 1.8	16
1.8 TO 1.9	3
1.9 TO 2.0	5
2.0 TO 2.4	25
2.4 TO 2.6	3
2.6 TO 2.8	7
2.8 TO 3.0	3
3.0 TO 3.5	6
3.5 TO 4.0	10
4.0 TO 4.5	4
OVER 4.5	17



Area: NEVN (Wavelength = 9.0 - 11.4 μm)
Temperature Threshold = Mean + 1.00 σ
Mean = 285.37 Kelvin
Std. Dev. = σ = 2.23 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.00 σ
Wavelength = 9.0 - 11.4 μm
Mean = 285.37 Kelvin
σ = 2.23 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	63
10.0	TO	15.0	41
15.0	TO	20.0	49
20.0	TO	25.0	23
25.0	TO	30.0	7
30.0	TO	35.0	11
35.0	TO	40.0	1
40.0	TO	45.0	[illegible]
45.0	TO	50.0	4
50.0	TO	75.0	21
75.0	TO	100.0	11
100.0	TO	150.0	11
150.0	TO	200.0	8
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	6
400.0	TO	500.0	2
OVER		500.0	20

TOTAL NUMBER OF ELLIPTICAL AREAS = 284

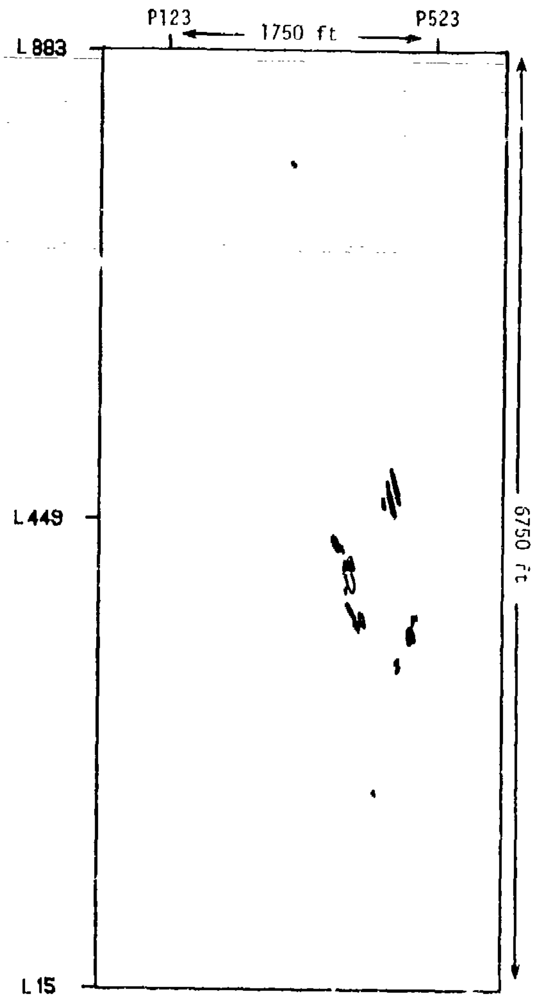
349 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	5
14	TO	16	45	TO	52	36
16	TO	17	52	TO	55	21
17	TO	20	55	TO	65	35
20	TO	22	65	TO	72	20
22	TO	24	72	TO	78	17
24	TO	26	78	TO	85	8
26	TO	28	85	TO	91	15
28	TO	30	91	TO	98	10
30	TO	32	98	TO	104	8
32	TO	39	104	TO	127	16
39	TO	45	127	TO	147	10
45	TO	55	147	TO	180	15
55	TO	71	180	TO	232	14
71	TO	100	232	TO	328	15
OVER		100	OVER		328	39

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	1
1.0	TO	1.1	0
1.1	TO	1.2	13
1.2	TO	1.3	2
1.3	TO	1.4	47
1.4	TO	1.5	8
1.5	TO	1.6	54
1.6	TO	1.7	14
1.7	TO	1.8	36
1.8	TO	1.9	12
1.9	TO	2.0	23
2.0	TO	2.4	23
2.4	TO	2.6	9
2.6	TO	2.8	8
2.8	TO	3.0	6
3.0	TO	3.5	7
3.5	TO	4.0	7
4.0	TO	4.5	6
OVER		4.5	8



Area: NFVN (Wavelength = 9.0 - 11.4 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 285.37 Kelvin
Std. Dev. = σ = 2.23 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS MOUNTAINS

NEVN

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 9.0 - 11.4 μm

Mean = 285.37 Kelvin

σ = 2.23 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	7
10.0 TO	15.0	3
15.0 TO	20.0	2
20.0 TO	25.0	2
25.0 TO	30.0	0
30.0 TO	35.0	3
35.0 TO	40.0	0
40.0 TO	45.0	3
45.0 TO	50.0	1
50.0 TO	75.0	2
75.0 TO	100.0	1
100.0 TO	150.0	2
150.0 TO	200.0	0
200.0 TO	250.0	3
250.0 TO	300.0	0
300.0 TO	400.0	2
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 32

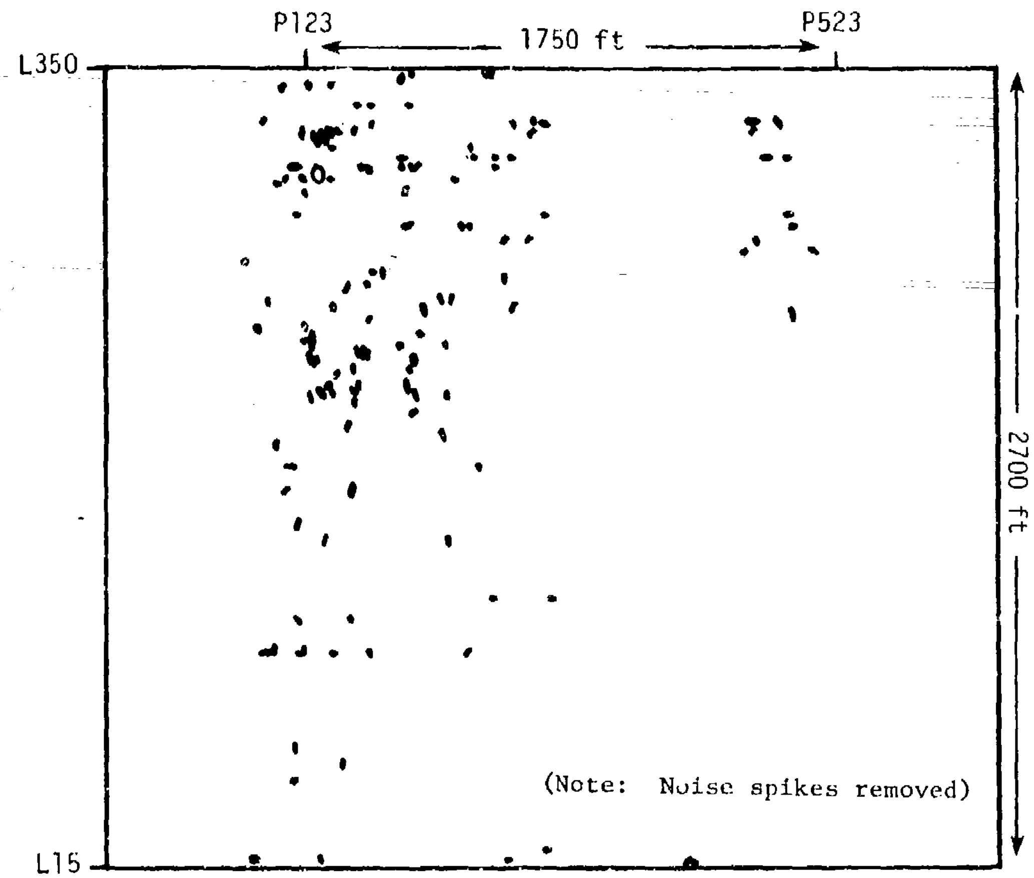
38 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	4
16 TO 17	52 TO 55	4
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	2
22 TO 24	72 TO 78	2
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	1
32 TO 39	104 TO 127	1
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	5
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	2
OVER 100	OVER 328	7

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	0
1.3 TO 1.4	3
1.4 TO 1.5	0
1.5 TO 1.6	7
1.6 TO 1.7	2
1.7 TO 1.8	1
1.8 TO 1.9	1
1.9 TO 2.0	2
2.0 TO 2.4	4
2.4 TO 2.6	4
2.6 TO 2.8	1
2.8 TO 3.0	2
3.0 TO 3.5	3
3.5 TO 4.0	1
4.0 TO 4.5	0
OVER 4.5	0



Area: NVH1 (Wavelength = 3.0 - 4.2 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 307.45 Kelvin

Std. Dev. = σ = 2.77 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVHI (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 3.0 - 4.2 μm
Mean = 307.45 Kelvin
σ = 2.77 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	176
10.0 TO	15.0	88
15.0 TO	20.0	84
20.0 TO	25.0	31
25.0 TO	30.0	18
30.0 TO	35.0	10
35.0 TO	40.0	10
40.0 TO	45.0	9
45.0 TO	50.0	5
50.0 TO	75.0	14
75.0 TO	100.0	6
100.0 TO	150.0	6
150.0 TO	200.0	2
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 459

(Note: Noise spikes removed from preceding picture.)

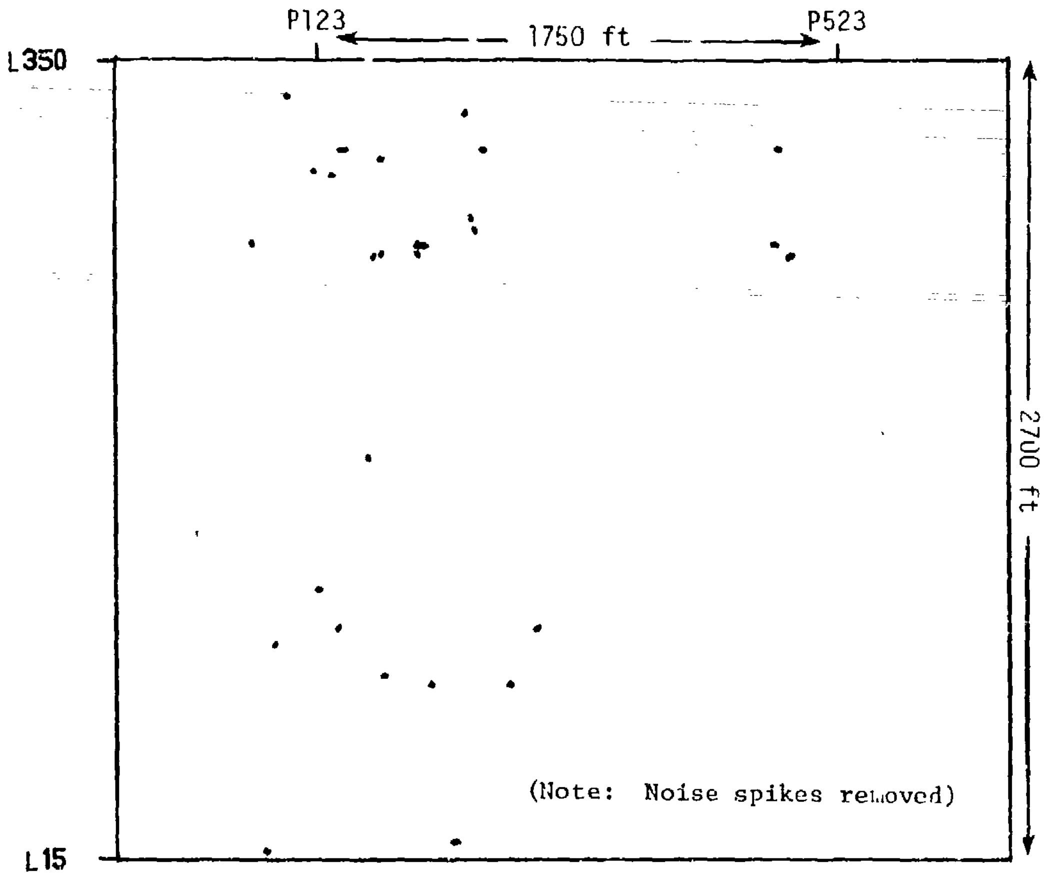
1770 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	1
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	68
14 TO 16	45 TO 52	98
16 TO 17	52 TO 55	16
17 TO 20	55 TO 65	91
20 TO 22	65 TO 72	32
22 TO 24	72 TO 78	11
24 TO 26	78 TO 85	25
26 TO 28	85 TO 91	12
28 TO 30	91 TO 98	19
30 TO 32	98 TO 104	6
32 TO 39	104 TO 127	21
39 TO 45	127 TO 147	13
45 TO 55	147 TO 180	15
55 TO 71	180 TO 232	14
71 TO 100	232 TO 328	11
OVER 100	OVER 328	6

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	0
1.1 TO 1.2	76
1.2 TO 1.3	58
1.3 TO 1.4	97
1.4 TO 1.5	19
1.5 TO 1.6	58
1.6 TO 1.7	22
1.7 TO 1.8	33
1.8 TO 1.9	6
1.9 TO 2.0	22
2.0 TO 2.4	39
2.4 TO 2.6	12
2.6 TO 2.8	8
2.8 TO 3.0	1
3.0 TO 3.5	5
3.5 TO 4.0	1
4.0 TO 4.5	1
OVER 4.5	0



Area: NVH1 (Wavelength = 3.0 - 4.2 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 307.45 Kelvin
Std. Dev. = σ = 2.77 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVH1 (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 3.0 - 4.2 μm

Mean = 307.45 Kelvin

σ = 2.77 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	46
10.0	TO	15.0	25
15.0	TO	20.0	16
20.0	TO	25.0	10
25.0	TO	30.0	2
30.0	TO	35.0	2
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	1
50.0	TO	75.0	1
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 104

(Note: Noise spikes removed from preceding picture.)

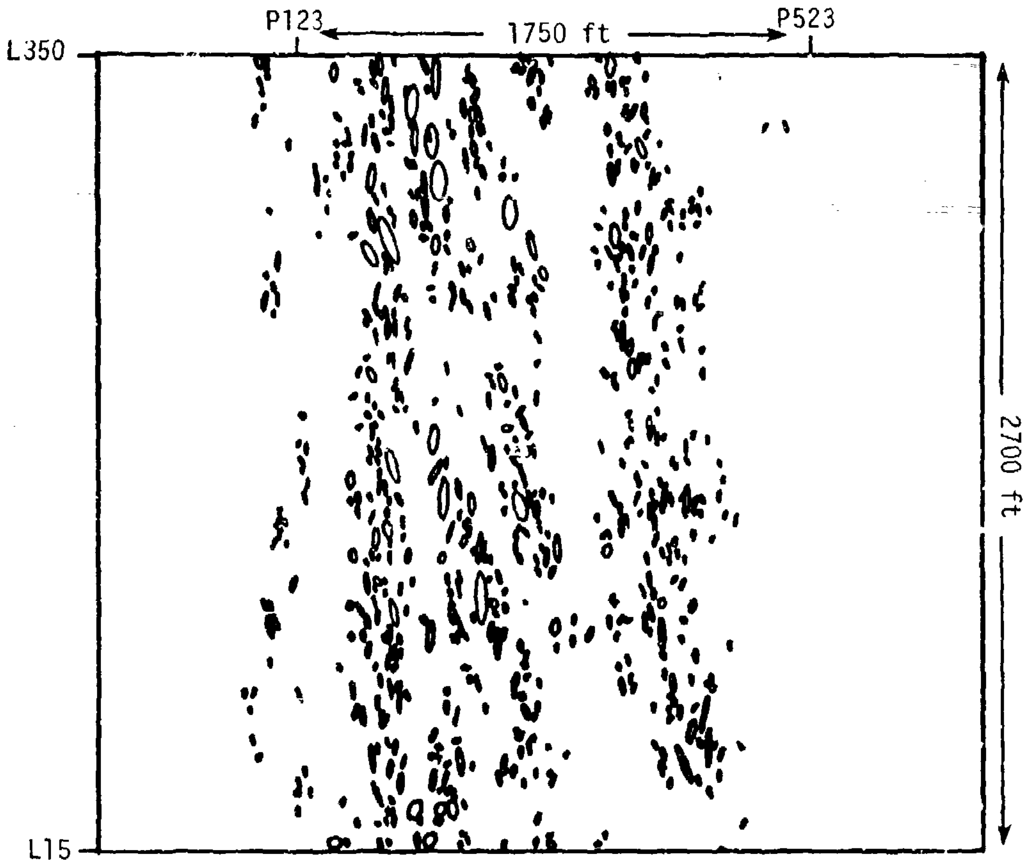
709 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	25
14	TO	16	45	TO	52	33
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	14
20	TO	22	65	TO	72	7
22	TO	24	72	TO	78	3
24	TO	26	78	TO	85	6
26	TO	28	85	TO	91	4
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	3
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	2
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
	OVER	100		OVER	328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	27
1.2	TO	1.3	17
1.3	TO	1.4	25
1.4	TO	1.5	7
1.5	TO	1.6	5
1.6	TO	1.7	4
1.7	TO	1.8	10
1.8	TO	1.9	4
1.9	TO	2.0	2
2.0	TO	2.4	3
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: NVH1 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 1.50 σ
Mean = 295.02 Kelvin
Std. Dev. = σ = 0.87 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVH1 (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 295.02 Kelvin

σ = 0.87 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	155
10.0	TO	15.0	119
15.0	TO	20.0	146
20.0	TO	25.0	61
25.0	TO	30.0	28
30.0	TO	35.0	30
35.0	TO	40.0	10
40.0	TO	45.0	19
45.0	TO	50.0	15
50.0	TO	75.0	35
75.0	TO	100.0	19
100.0	TO	150.0	21
150.0	TO	200.0	4
200.0	TO	250.0	1
250.0	TO	300.0	6
300.0	TO	400.0	0
400.0	TO	500.0	3
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 672

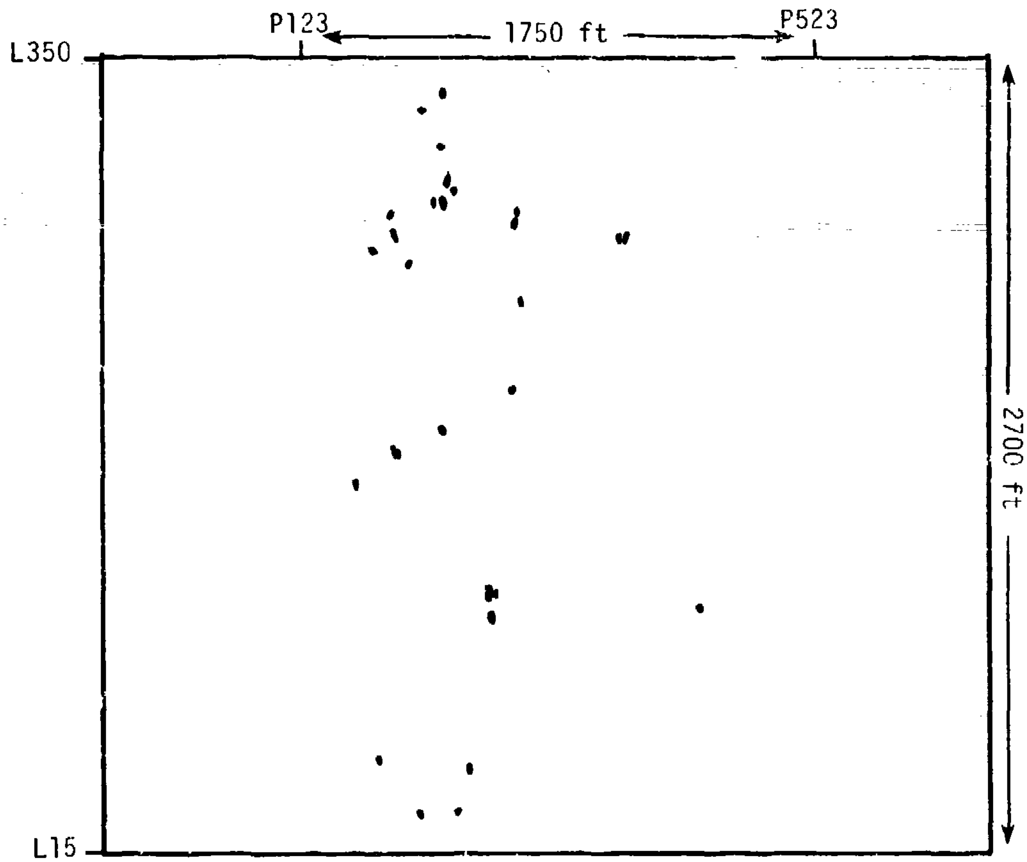
1102 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	8
14	TO	16	45	TO	52	89
16	TO	17	52	TO	55	43
17	TO	20	55	TO	65	110
20	TO	22	65	TO	72	48
22	TO	24	72	TO	78	38
24	TO	26	78	TO	85	14
26	TO	28	85	TO	91	47
28	TO	30	91	TO	98	26
30	TO	32	98	TO	104	39
32	TO	39	104	TO	127	50
39	TO	45	127	TO	147	26
45	TO	55	147	TO	180	36
55	TO	71	180	TO	232	28
71	TO	100	232	TO	328	33
	OVER	100		OVER	328	37

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	1
1.0	TO	1.1	0
1.1	TO	1.2	24
1.2	TO	1.3	9
1.3	TO	1.4	107
1.4	TO	1.5	21
1.5	TO	1.6	121
1.6	TO	1.7	34
1.7	TO	1.8	78
1.8	TO	1.9	18
1.9	TO	2.0	46
2.0	TO	2.4	122
2.4	TO	2.6	25
2.6	TO	2.8	18
2.8	TO	3.0	5
3.0	TO	3.5	24
3.5	TO	4.0	7
4.0	TO	4.5	9
	OVER	4.5	3



Area: NVH1 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 295.02 Kelvin
Std. Dev. = σ = 0.87 Kelvin
EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVH1 (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 4 5 - 5.5 μm

Mean = 295.02 Kelvin

σ = 0.87 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	17
10.0 TO	15.0	7
15.0 TO	20.0	2
20.0 TO	25.0	3
25.0 TO	30.0	1
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 30

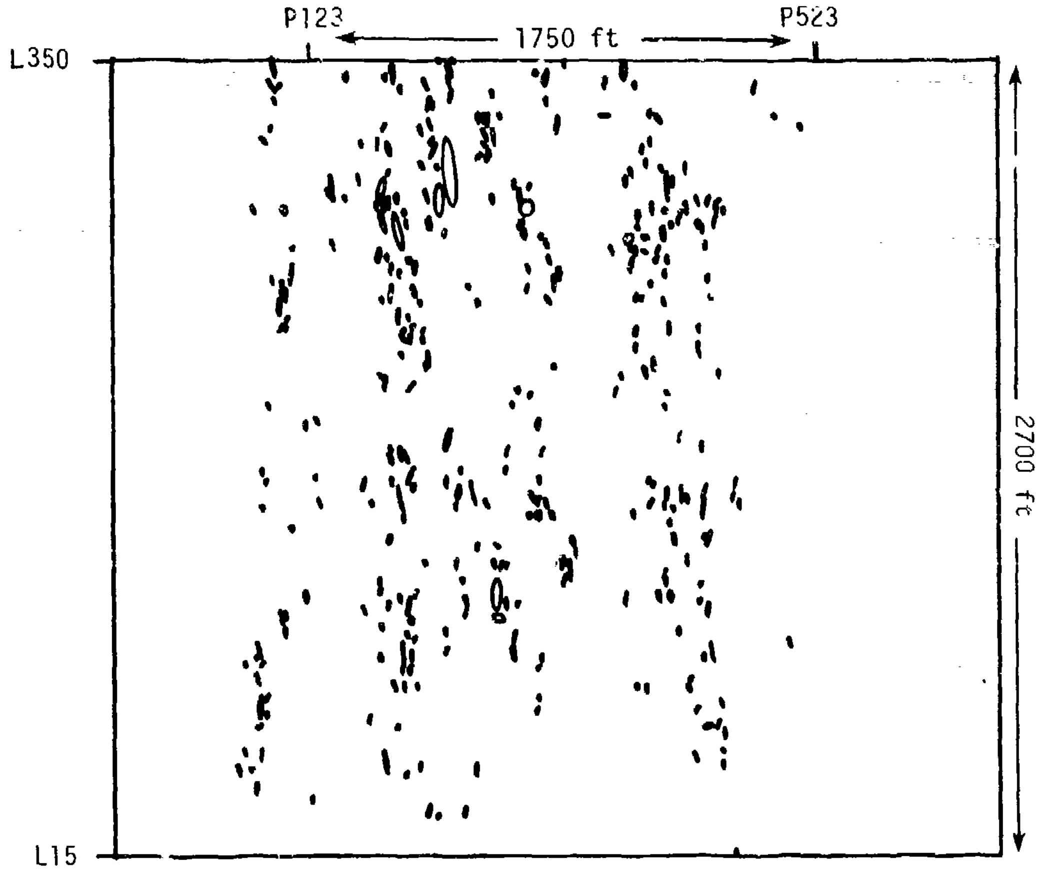
164 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	2
14 TO	16	45 TO	52	10
16 TO	17	52 TO	55	4
17 TO	20	55 TO	65	8
20 TO	22	65 TO	72	1
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	1
28 TO	30	91 TO	98	1
30 TO	32	98 TO	104	1
32 TO	39	104 TO	127	1
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	0
55 TO	71	180 TO	232	0
71 TO	100	232 TO	328	0
OVER	100	OVER	328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	3
1.2 TO 1.3	1
1.3 TO 1.4	12
1.4 TO 1.5	0
1.5 TO 1.6	8
1.6 TO 1.7	1
1.7 TO 1.8	2
1.8 TO 1.9	0
1.9 TO 2.0	2
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: NVH1 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 298.72 Kelvin

Std. Dev. = σ = 1.21 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVH1 (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 298.72 Kelvin

σ = 1.21 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	[illegible]
10.0	TO	15.0	62
15.0	TO	20.0	76
20.0	TO	25.0	36
25.0	TO	30.0	12
30.0	TO	35.0	17
35.0	TO	40.0	2
40.0	TO	45.0	4
45.0	TO	50.0	1
50.0	TO	75.0	9
75.0	TO	100.0	2
100.0	TO	150.0	1
150.0	TO	200.0	3
200.0	TO	250.0	1
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 353

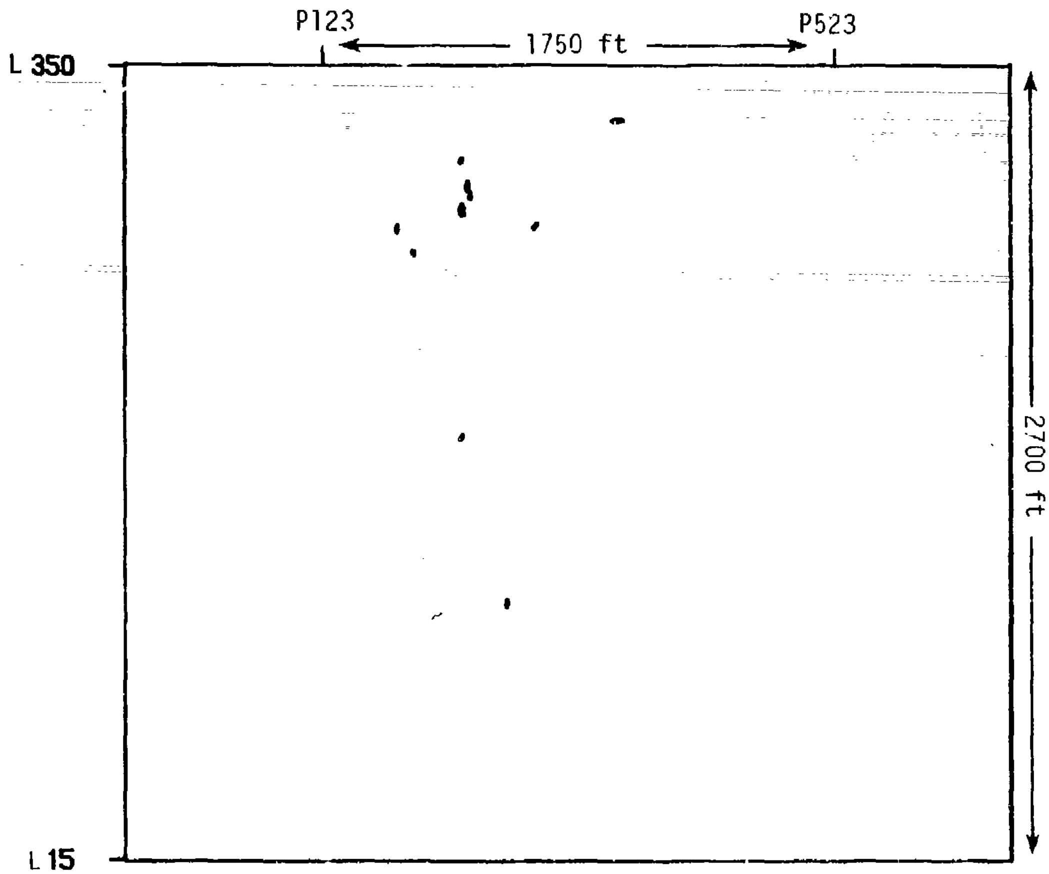
860 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	2
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	1
14	TO	16	45	TO	52	69
16	TO	17	52	TO	55	31
17	TO	20	55	TO	65	72
20	TO	22	65	TO	72	28
22	TO	24	72	TO	78	21
24	TO	26	78	TO	85	5
26	TO	28	85	TO	91	24
28	TO	30	91	TO	98	18
30	TO	32	98	TO	104	14
32	TO	39	104	TO	127	31
39	TO	45	127	TO	147	9
45	TO	55	147	TO	180	9
55	TO	71	180	TO	232	9
71	TO	100	232	TO	328	4
OVER		100	OVER		328	6

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	2
1.0	TO	1.1	0
1.1	TO	1.2	9
1.2	TO	1.3	6
1.3	TO	1.4	74
1.4	TO	1.5	6
1.5	TO	1.6	79
1.6	TO	1.7	12
1.7	TO	1.8	60
1.8	TO	1.9	15
1.9	TO	2.0	24
2.0	TO	2.4	43
2.4	TO	2.6	10
2.6	TO	2.8	6
2.8	TO	3.0	1
3.0	TO	3.5	2
3.5	TO	4.0	2
4.0	TO	4.5	1
	OVER	4.5	1



Area: NVH1 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 2.50 σ

Mean = 298.72 Kelvin

Std. Dev. = σ = 1.21 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT

NVH1 (Desert)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.50 σ

Wavelength = 9.0 - 11.4 μm

Mean = 298.72 Kelvin

σ = 1.21 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	5
10.0	TO	15.0	1
15.0	TO	20.0	2
20.0	TO	25.0	1
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 10

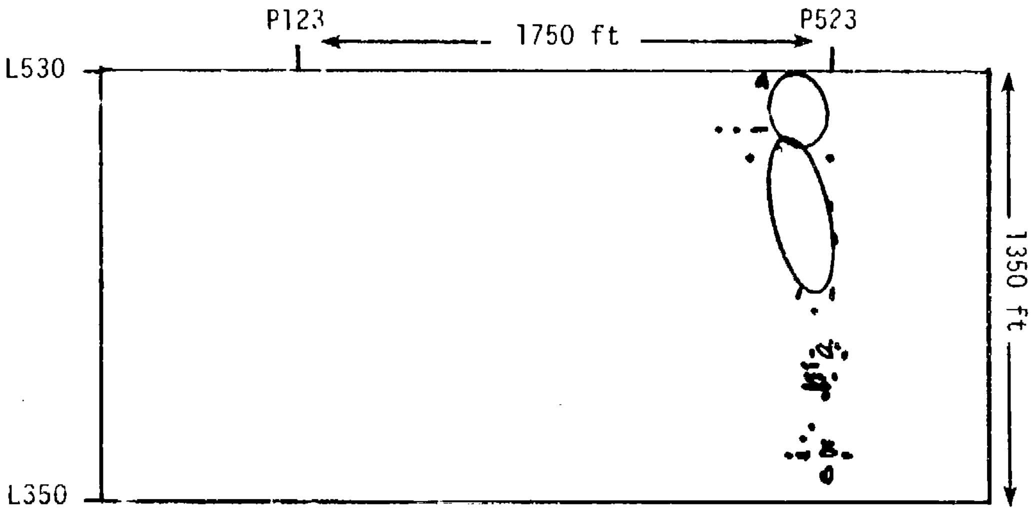
105 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	3
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	2
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	2
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	5
1.4 TO 1.5	1
1.5 TO 1.6	3
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: NVH1 (Wavelength = 3.0 - 4.2 μm)

Temperature Threshold = Mean + 2.00 σ

Mean = 312.90 Kelvin

Std. Dev. = σ = 3.52 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 3.0 - 4.2 μm
Mean = 312.90 Kelvin
σ = 3.52 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	15
10.0	TO	15.0	8
15.0	TO	20.0	7
20.0	TO	25.0	4
25.0	TO	30.0	1
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	1
75.0	TO	100.0	1
100.0	TO	150.0	1
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 42

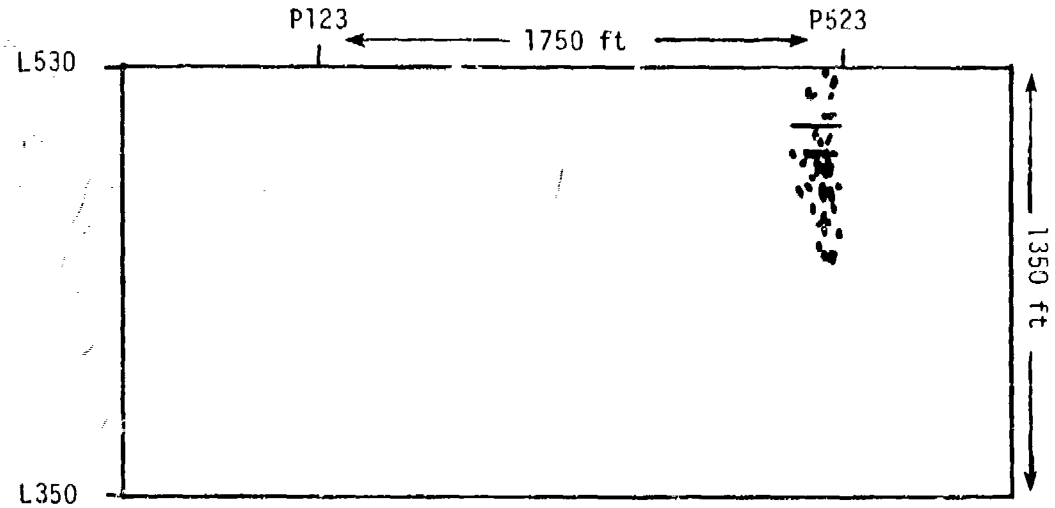
215 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	4
14	TO	16	45	TO	52	9
16	TO	17	52	TO	55	1
17	TO	20	55	TO	65	7
20	TO	22	65	TO	72	3
22	TO	24	72	TO	78	3
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	4
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	2
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	1
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	1
	OVER	100		OVER	328	4

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	4
1.2	TO	1.3	3
1.3	TO	1.4	8
1.4	TO	1.5	3
1.5	TO	1.6	5
1.6	TO	1.7	2
1.7	TO	1.8	7
1.8	TO	1.9	1
1.9	TO	2.0	0
2.0	TO	2.4	4
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	1
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	2



Area: NVHI (Wavelength = 3.0 - 4.2 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 312.90 Kelvin

Std. Dev. = σ = 3.52 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 3.0 - 4.2 μm

Mean = 312.90 Kelvin

σ = 3.52 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	16
10.0	TO	15.0	11
15.0	TO	20.0	5
20.0	TO	25.0	1
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	1
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	3
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
OVER		500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 39

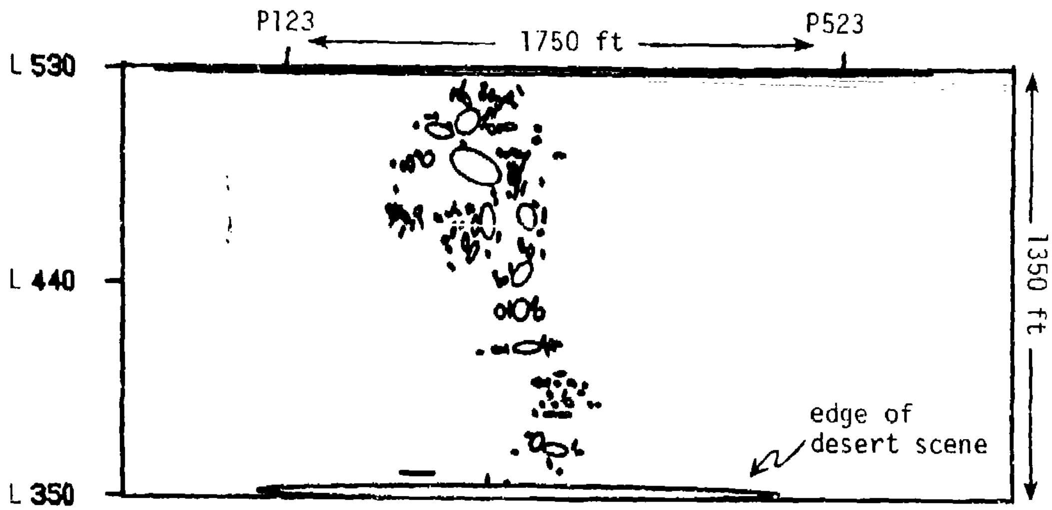
103 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	2
14	TO	16	45	TO	52	7
16	TO	17	52	TO	55	2
17	TO	20	55	TO	65	7
20	TO	22	65	TO	72	10
22	TO	24	72	TO	78	1
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	2
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	1
55	TO	71	180	TO	232	3
71	TO	100	232	TO	328	2
OVER		100	OVER		328	0

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	3
1.2	TO	1.3	0
1.3	TO	1.4	8
1.4	TO	1.5	0
1.5	TO	1.6	8
1.6	TO	1.7	1
1.7	TO	1.8	6
1.8	TO	1.9	0
1.9	TO	2.0	2
2.0	TO	2.4	4
2.4	TO	2.6	5
2.6	TO	2.8	1
2.8	TO	3.0	1
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
OVER		4.5	0



Area: NVH1 (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 1.00 σ

Mean = 290.16 Kelvin

Std. Dev. = σ = 0.91 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 290.16 Kelvin
σ = 0.91 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	40
10.0 TO	15.0	19
15.0 TO	20.0	31
20.0 TO	25.0	10
25.0 TO	30.0	1
30.0 TO	35.0	7
35.0 TO	40.0	1
40.0 TO	45.0	3
45.0 TO	50.0	6
50.0 TO	75.0	7
75.0 TO	100.0	2
100.0 TO	150.0	3
150.0 TO	200.0	1
200.0 TO	250.0	3
250.0 TO	300.0	1
300.0 TO	400.0	2
400.0 TO	500.0	1
OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 141

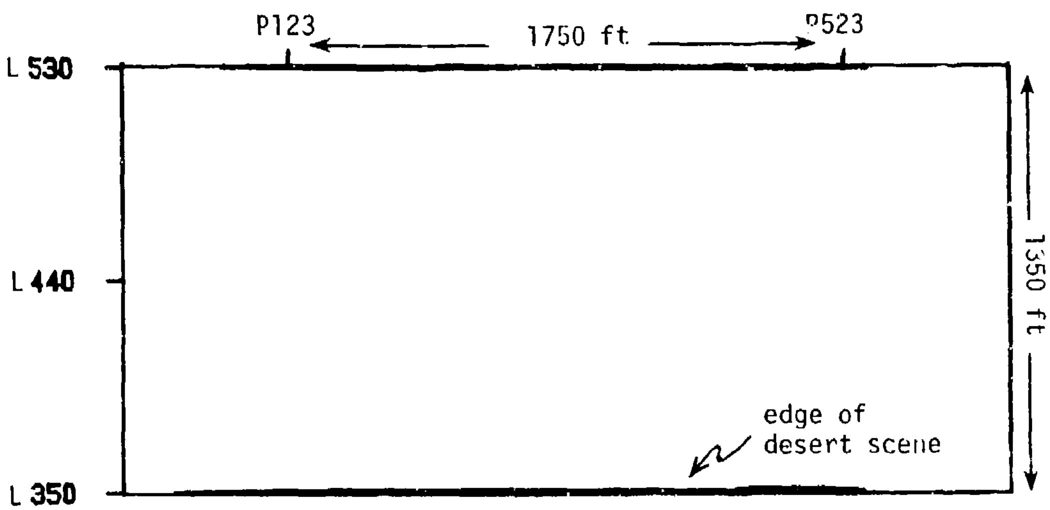
519 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	2
7 TO 10	22 TO 32	1
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	6
14 TO 16	45 TO 52	19
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	18
20 TO 22	65 TO 72	16
22 TO 24	72 TO 78	6
24 TO 26	78 TO 85	4
26 TO 28	85 TO 91	6
28 TO 30	91 TO 98	6
30 TO 32	98 TO 104	3
32 TO 39	104 TO 127	10
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	9
55 TO 71	180 TO 232	9
71 TO 100	232 TO 328	7
OVER 100	OVER 328	17

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	4
1.0 TO 1.1	0
1.1 TO 1.2	7
1.2 TO 1.3	6
1.3 TO 1.4	18
1.4 TO 1.5	2
1.5 TO 1.6	13
1.6 TO 1.7	2
1.7 TO 1.8	11
1.8 TO 1.9	3
1.9 TO 2.0	7
2.0 TO 2.4	29
2.4 TO 2.6	7
2.6 TO 2.8	3
2.8 TO 3.0	4
3.0 TO 3.5	10
3.5 TO 4.0	3
4.0 TO 4.5	3
OVER 4.5	9



Area: NVH1 (Wavelength = 4.5 - 5.5 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 290.16 Kelvin

Std. Dev. = σ = 0.91 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 290.16 Kelvin

σ = 0.91 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	0
10.0	TO	15.0	2
15.0	TO	20.0	2
20.0	TO	25.0	0
25.0	TO	30.0	0
30.0	TO	35.0	1
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	1
150.0	TO	200.0	0
200.0	TO	250.0	2
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 14

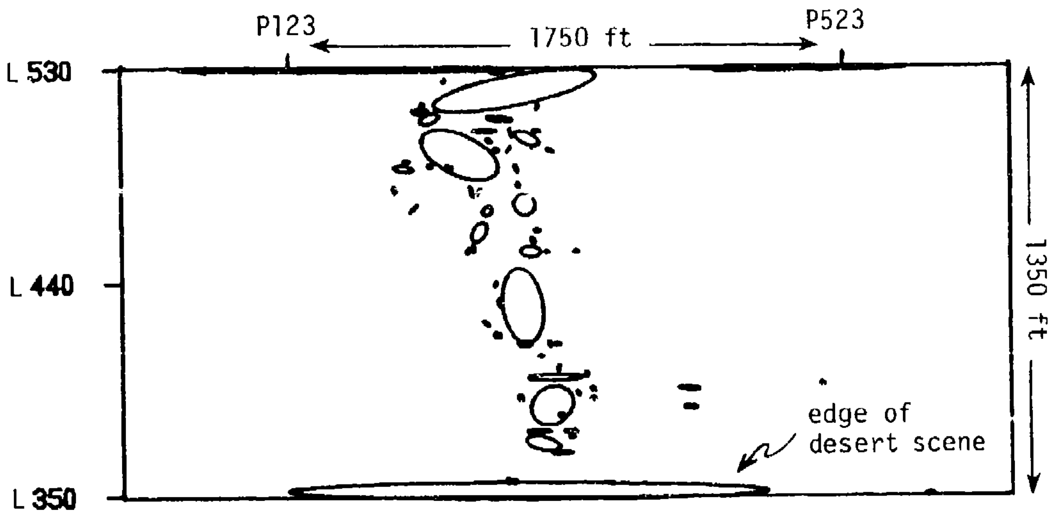
7 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	3
10 TO 12	32 TO 39	1
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	1
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	1
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	1
71 TO 100	232 TO 328	2
OVER 100	OVER 328	4

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	5
1.0 TO 1.1	1
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	2
1.5 TO 1.6	2
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	0
2.4 TO 2.6	2
2.6 TO 2.8	1
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	1



Area: MVH1 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.00 σ

Mean = 291.94 Kelvin

Std. Dev. = σ = 1.57 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 291.94 Kelvin

σ = 1.57 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	20
10.0 TO	15.0	16
15.0 TO	20.0	6
20.0 TO	25.0	3
25.0 TO	30.0	0
30.0 TO	35.0	1
35.0 TO	40.0	2
40.0 TO	45.0	1
45.0 TO	50.0	3
50.0 TO	75.0	4
75.0 TO	100.0	2
100.0 TO	150.0	1
150.0 TO	200.0	1
200.0 TO	250.0	2
250.0 TO	300.0	1
300.0 TO	400.0	2
400.0 TO	500.0	0
OVER	500.0	7

TOTAL NUMBER OF ELLIPTICAL AREAS = 72

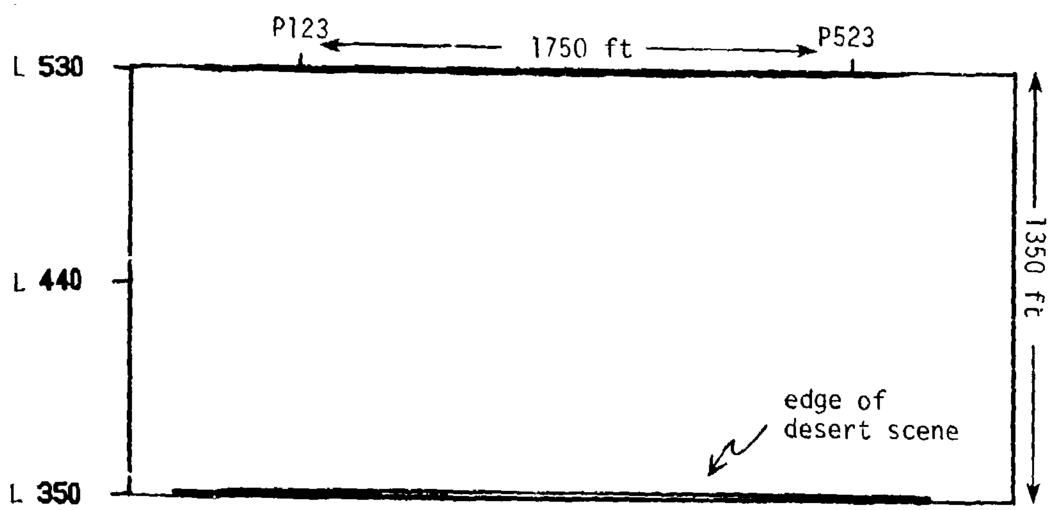
133 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	7
14 TO	16	45 TO	52	15
16 TO	17	52 TO	55	1
17 TO	20	55 TO	65	11
20 TO	22	65 TO	72	4
22 TO	24	72 TO	78	2
24 TO	26	78 TO	85	4
26 TO	28	85 TO	91	4
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	2
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	4
55 TO	71	180 TO	232	3
71 TO	100	232 TO	328	1
OVER	100	OVER	328	14

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	2
1.0 TO 1.1	1
1.1 TO 1.2	10
1.2 TO 1.3	6
1.3 TO 1.4	11
1.4 TO 1.5	2
1.5 TO 1.6	7
1.6 TO 1.7	4
1.7 TO 1.8	5
1.8 TO 1.9	0
1.9 TO 2.0	5
2.0 TO 2.4	7
2.4 TO 2.6	1
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	3
3.5 TO 4.0	1
4.0 TO 4.5	0
OVER 4.5	5



Area: NVH1 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.50 σ

Mean = 291.94 Kelvin

Std. Dev. = σ = 1.57 Kelvin

EQUIVALENT ELLIPTICAL AREAS FOR NELLIS DESERT - DRY LAKE

NVH1 (Dry Lake)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 9.0 - 11.4 μm

Mean = 291.94 Kelvin

σ = 1.57 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	3
10.0	TO	15.0	0
15.0	TO	20.0	0
20.0	TO	25.0	1
25.0	TO	30.0	0
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	0
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	1
400.0	TO	500.0	1
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 11

6 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	1
7	TO	10	22	TO	32	2
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	1
17	TO	20	55	TO	65	0
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	0
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	0
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	0
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	0
OVER		100	OVER		328	5

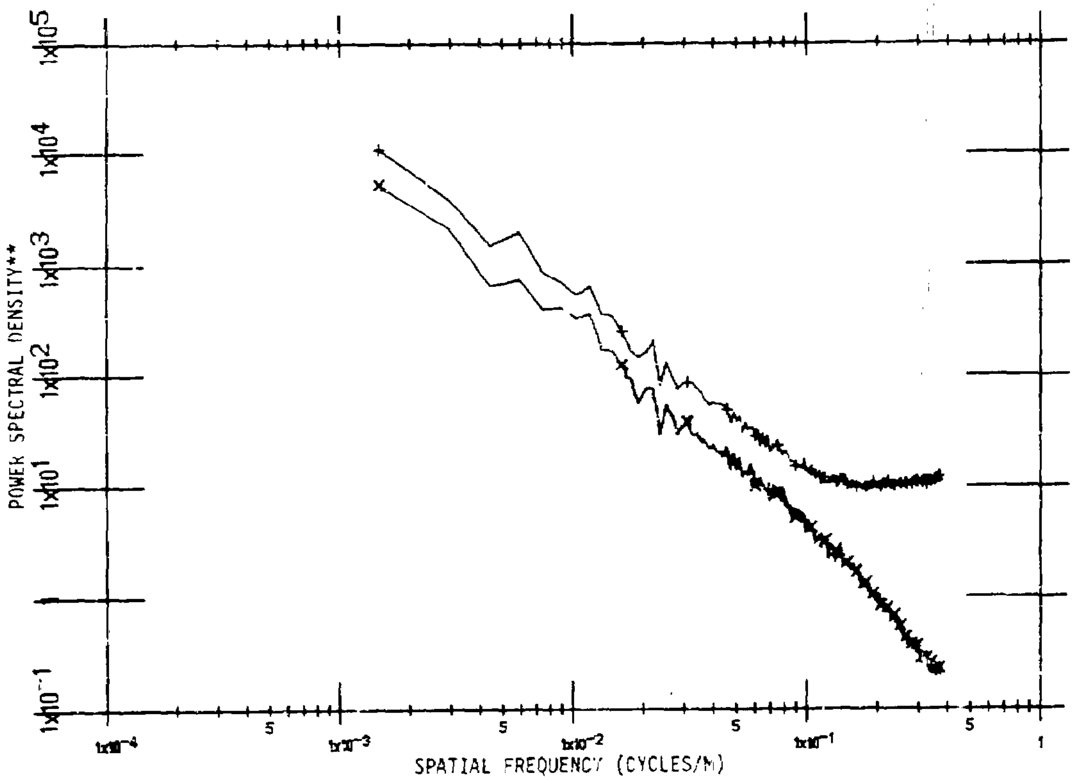
BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	4
1.0	TO	1.1	0
1.1	TO	1.2	1
1.2	TO	1.3	0
1.3	TO	1.4	0
1.4	TO	1.5	1
1.5	TO	1.6	0
1.6	TO	1.7	1
1.7	TO	1.8	0
1.8	TO	1.9	0
1.9	TO	2.0	0
2.0	TO	2.4	2
2.4	TO	2.6	0
2.6	TO	2.8	0
2.8	TO	3.0	1
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	1

NELLIS AFB, NEVADA

Power Spectra

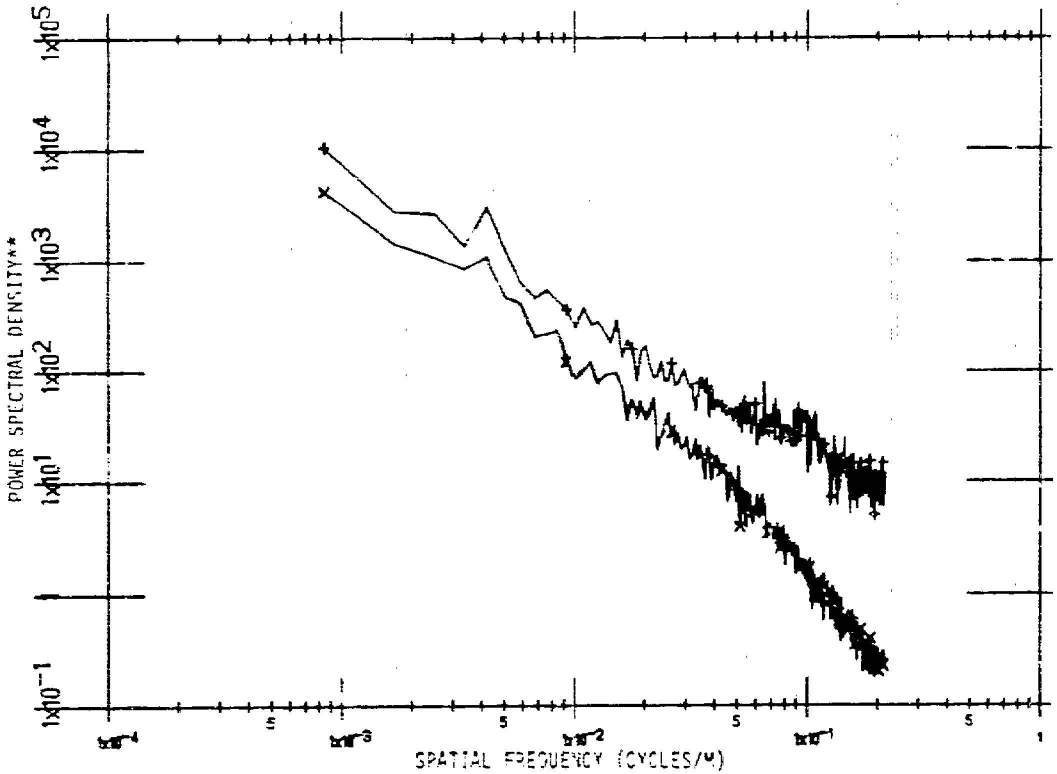
Spectral Bands: 2.0 - 2.6 μm
3.0 - 4.2 μm
3.5 - 3.9 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: NEVF CROSS-TRACK Wavelength = 3.5-3.9 (+), 9.0-11.4 (X)

POWER SPECTRA (Mountains)

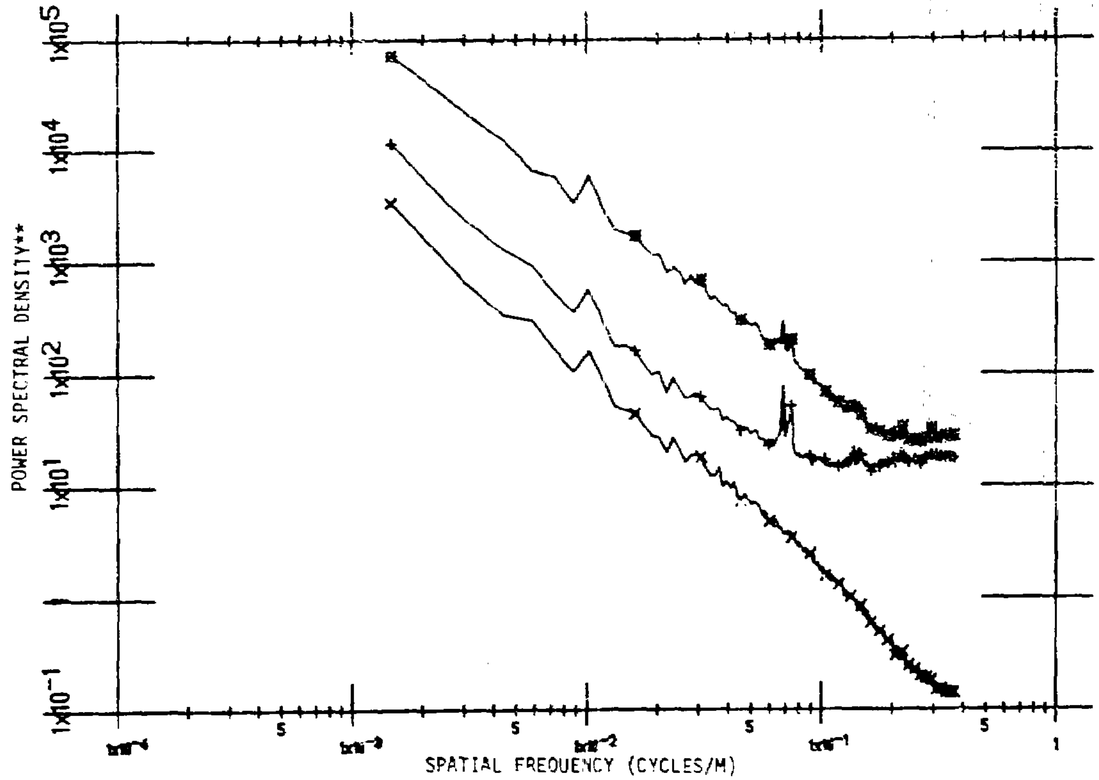
**Power spectral density is (°K)^2/cycle/meter for the 3.5 to 3.9 and 9.0 to 11.4 μm bands.



Area: NEVF IN-TRACK Wavelength = 3.5-3.9 (+), 9.0-11.4 (X)

POWER SPECTRA (Mountains)

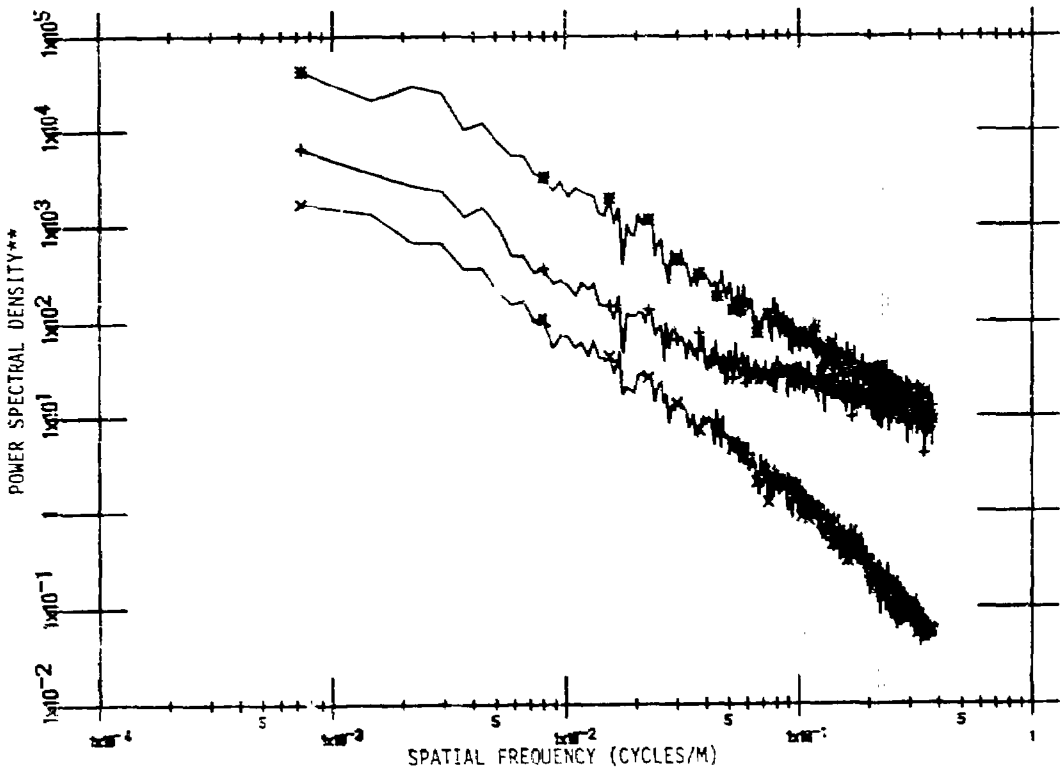
**Power spectral density is $(°K)^2$/cycle/meter for the 3.5 to 3.9 and 9.0 to 11.4 um bands.



Area: NVG1 CROSS-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Mountains)

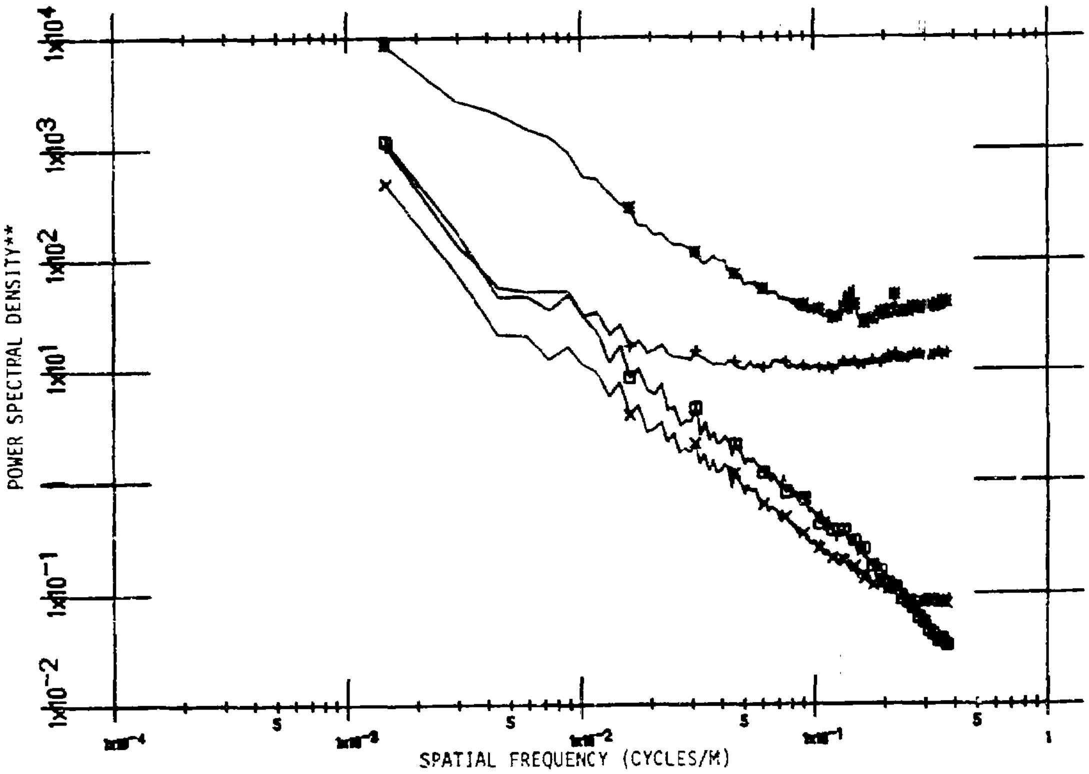
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm bands.



Area: NVG1 IN-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Mountains)

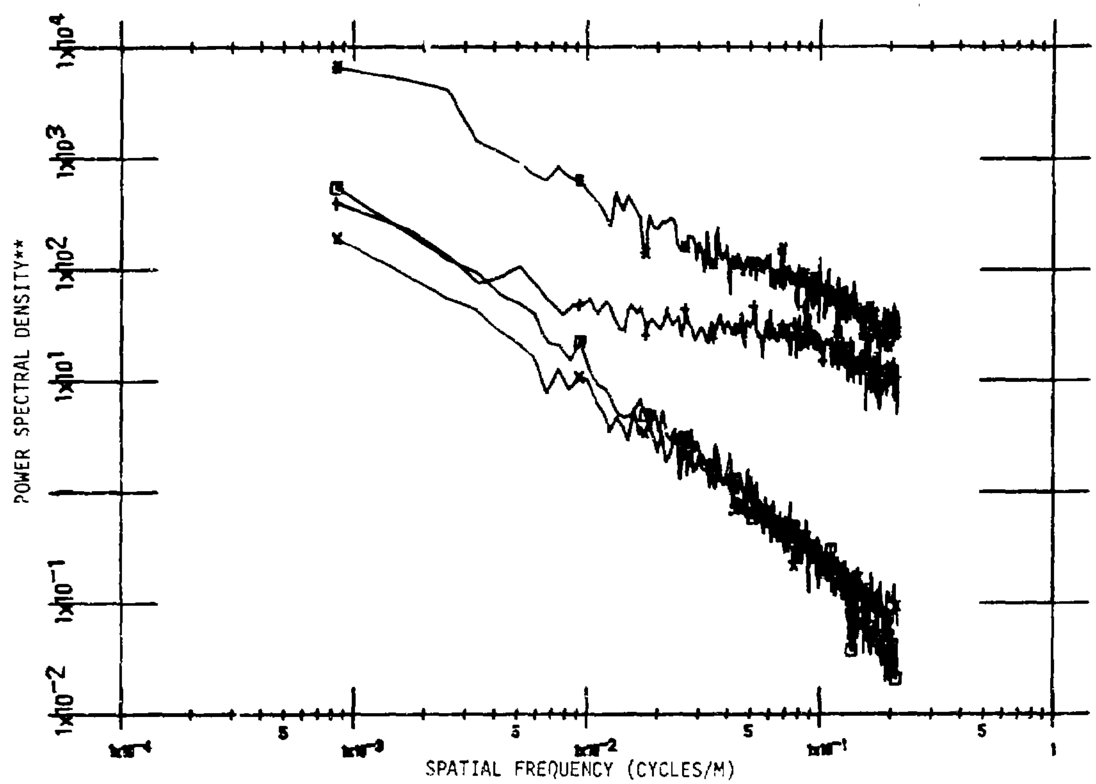
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm bands.



Area: NEVN CROSS-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA (Mountains)

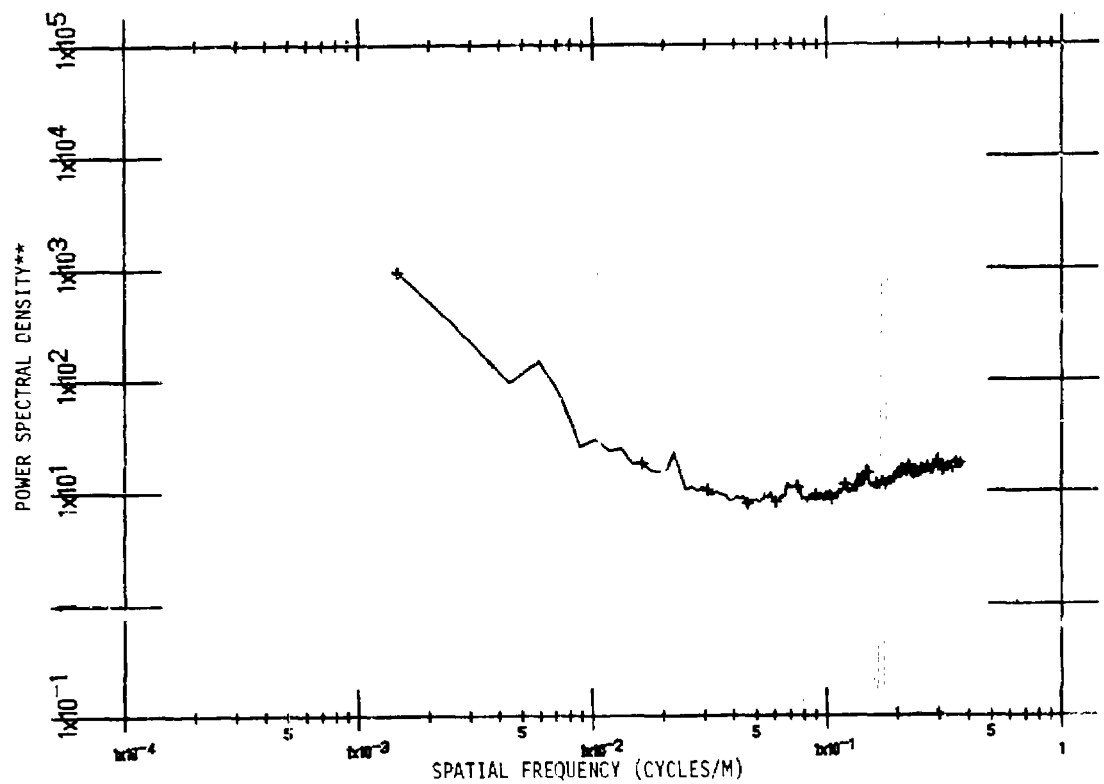
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^{\circ}K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: NEVN IN-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA (Mountains)

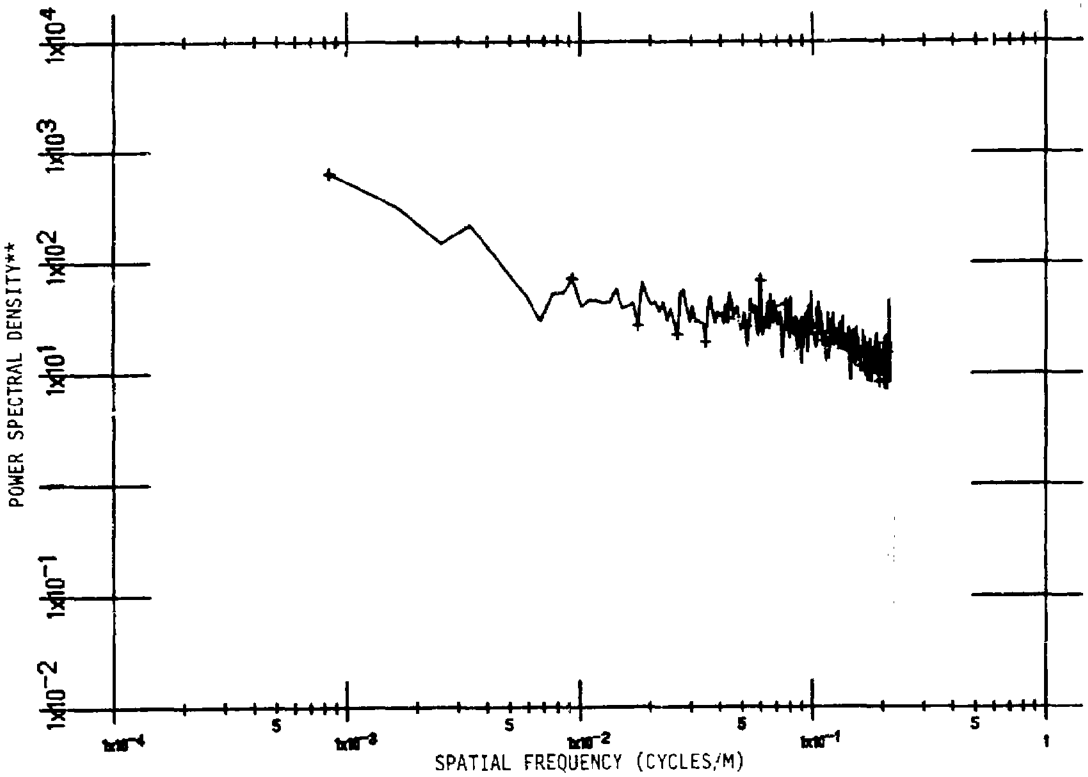
**Power spectral density is ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: NEVM CROSS-TRACK Wavelength = 3.5-3.9 (+)

POWER SPECTRA (Mountains)

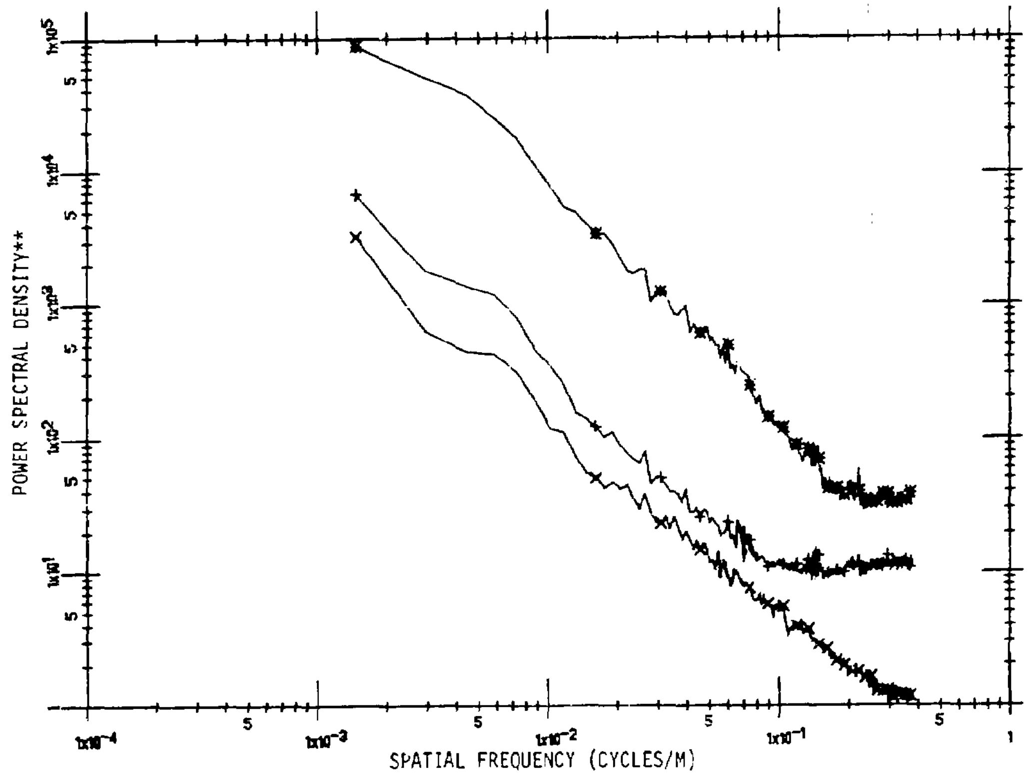
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 3.5 to 3.9 μm band.



Area: NEVM   IN-TRACK   *Wavelength* = 3.5-3.9 (+)

POWER SPECTRA (Mountains)

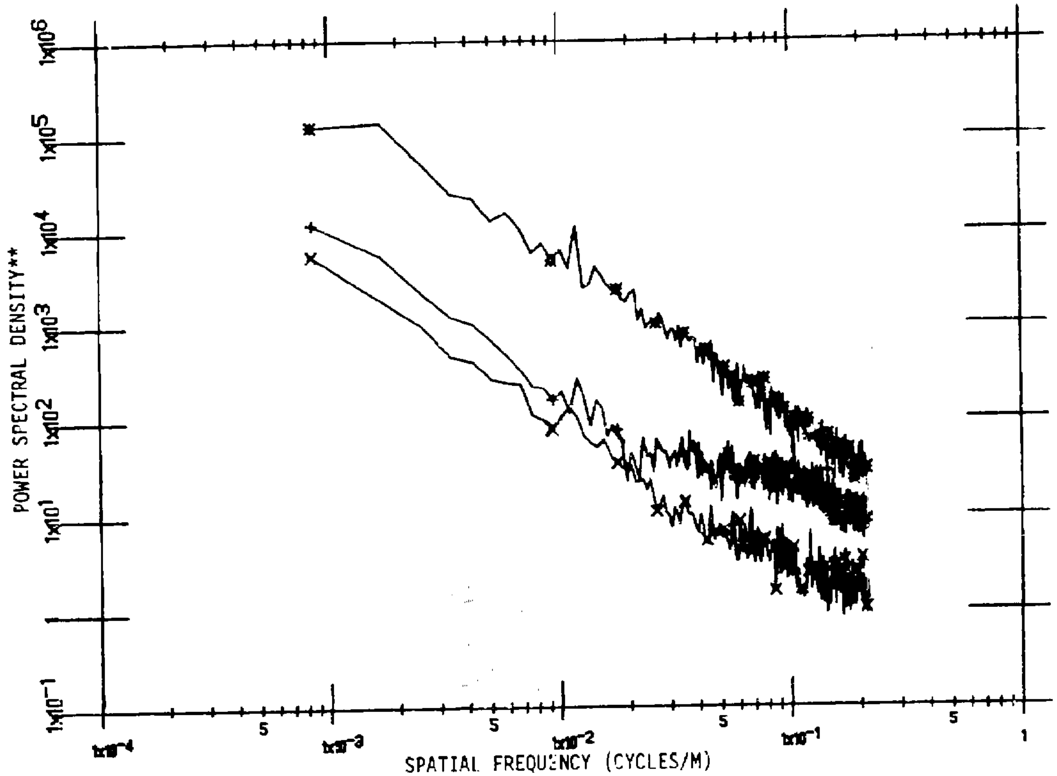
**Power spectral density is $(°K)^2$/cycle/meter for the 3.5 to 3.9 μm band.



Area: NEVI   CROSS-TRACK   Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Mountains)

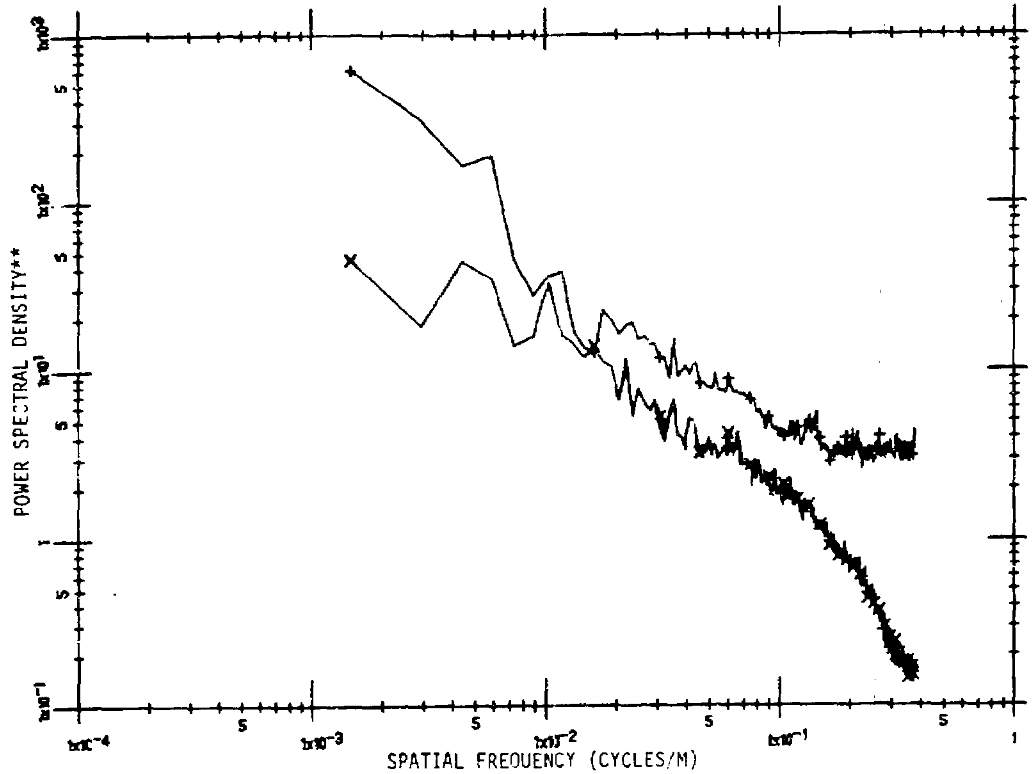
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm band.



Area: NEVI IN-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Mountains)

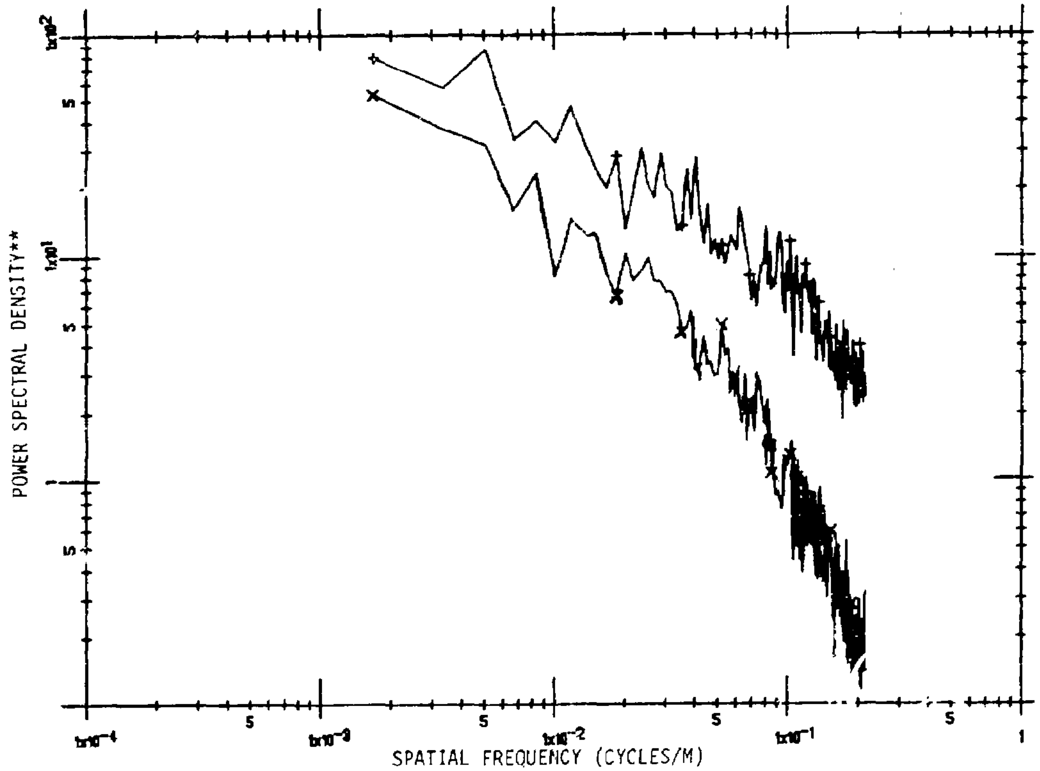
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^{\circ}K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm bands.



Area: NEVC1 CROSS-TRACK Wavelength = 3.5-3.9 (+), 9.0-11.4 (X)

POWER SPECTRA (Desert)

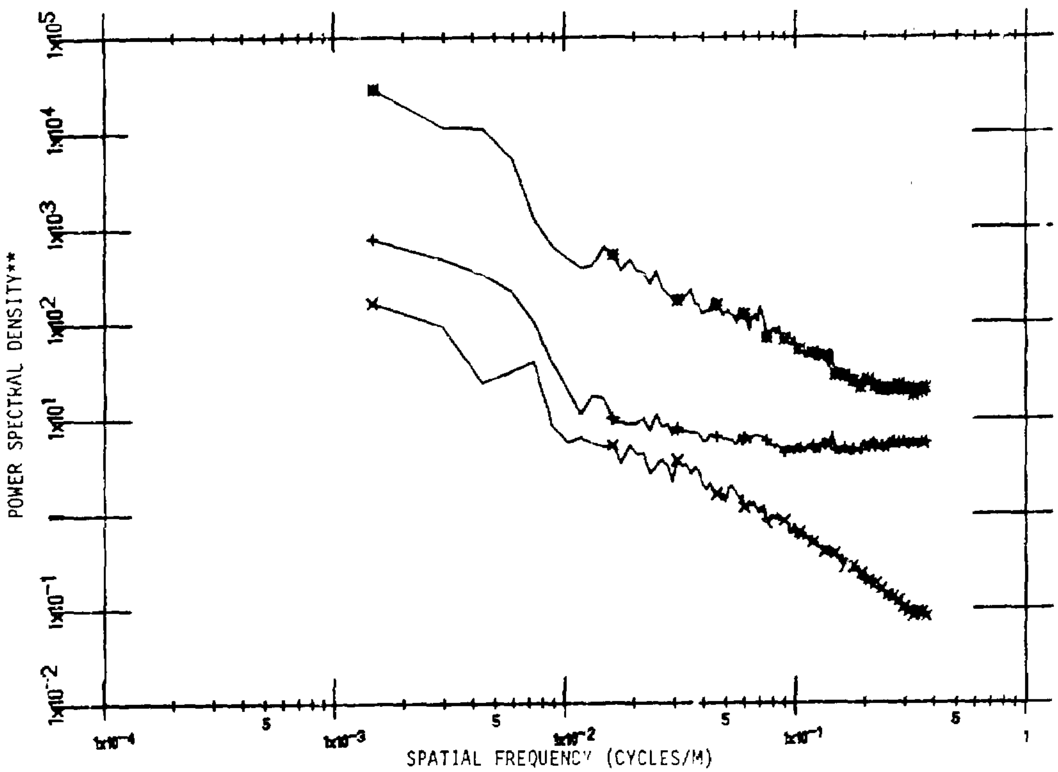
**Power spectral density is $(°K)^2$/cycle/meter for the 3.5 to 3.9 and 9.0 to 11.4 μm bands.



Area: NEVC1 IN-TRACK Wavelength = 3.5-3.9 (+), 9.0-11.4 (X)

POWER SPECTRA (Desert)

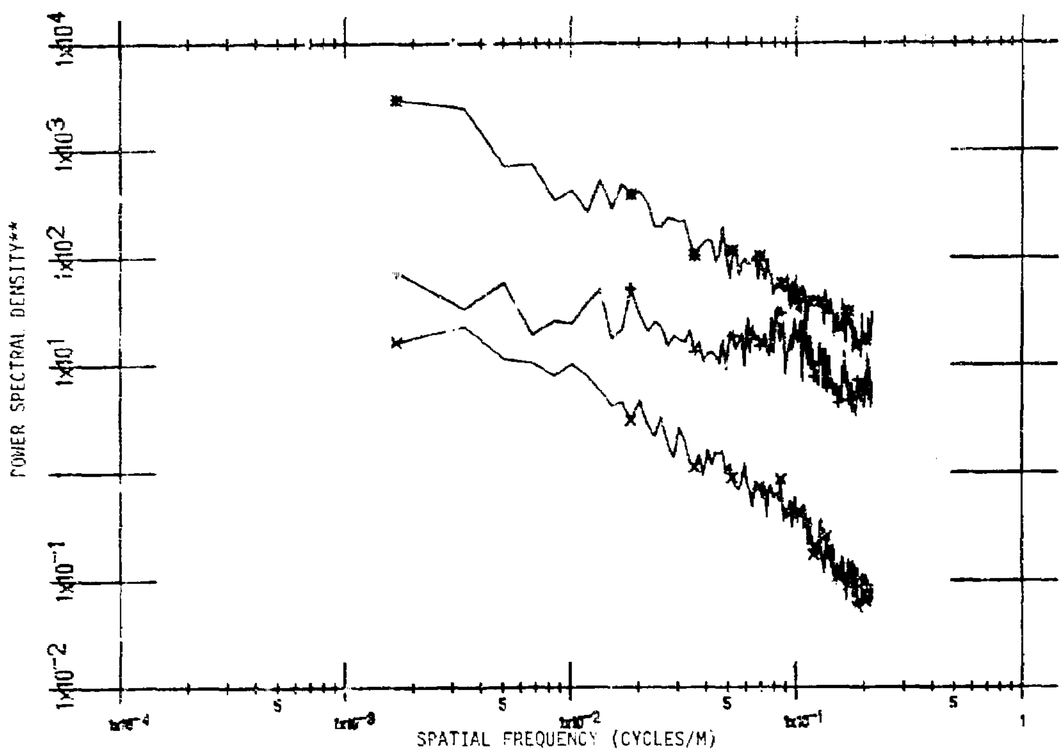
**Power spectral density is $(^{\circ}K)^2$/cycle/meter for the 3.5 to 3.9 and 9.0 to 11.4 μm bands.



Area: NVH1 CROSS-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Desert)

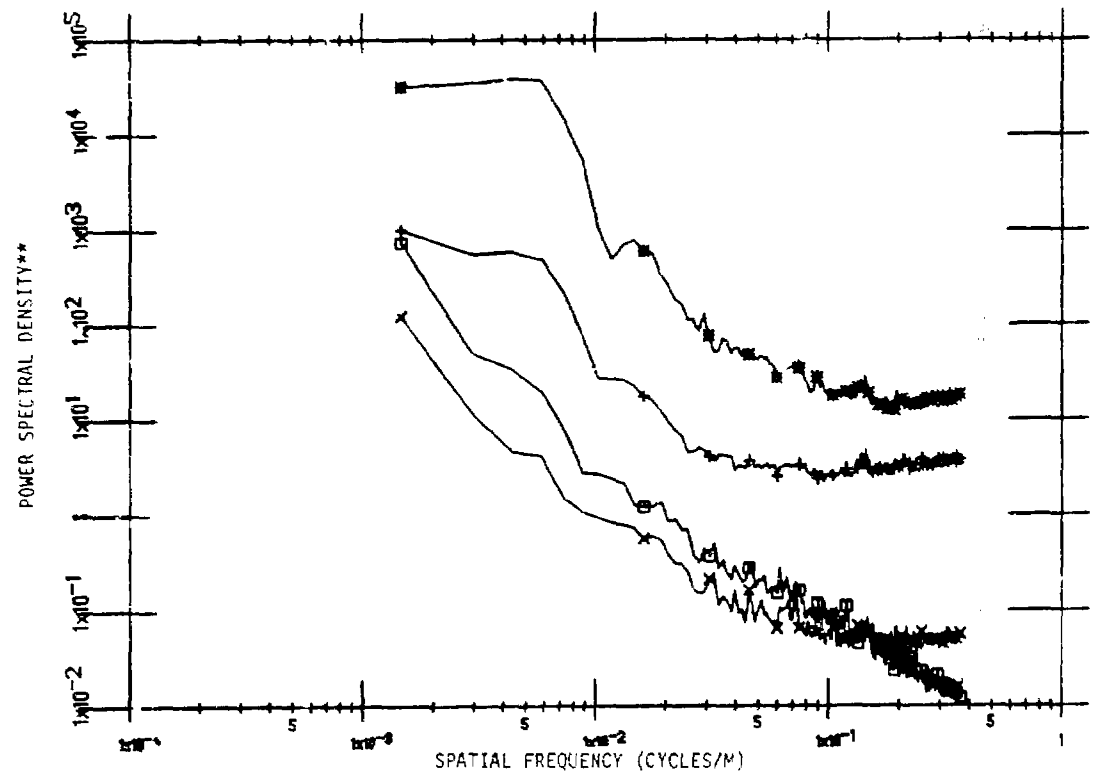
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm bands.



Area: NVH1 IN-TRACK Wavelength = 2.0-2.6 (+), 3.0-4.2 (+), 4.5-5.5 (X)

POWER SPECTRA (Desert)

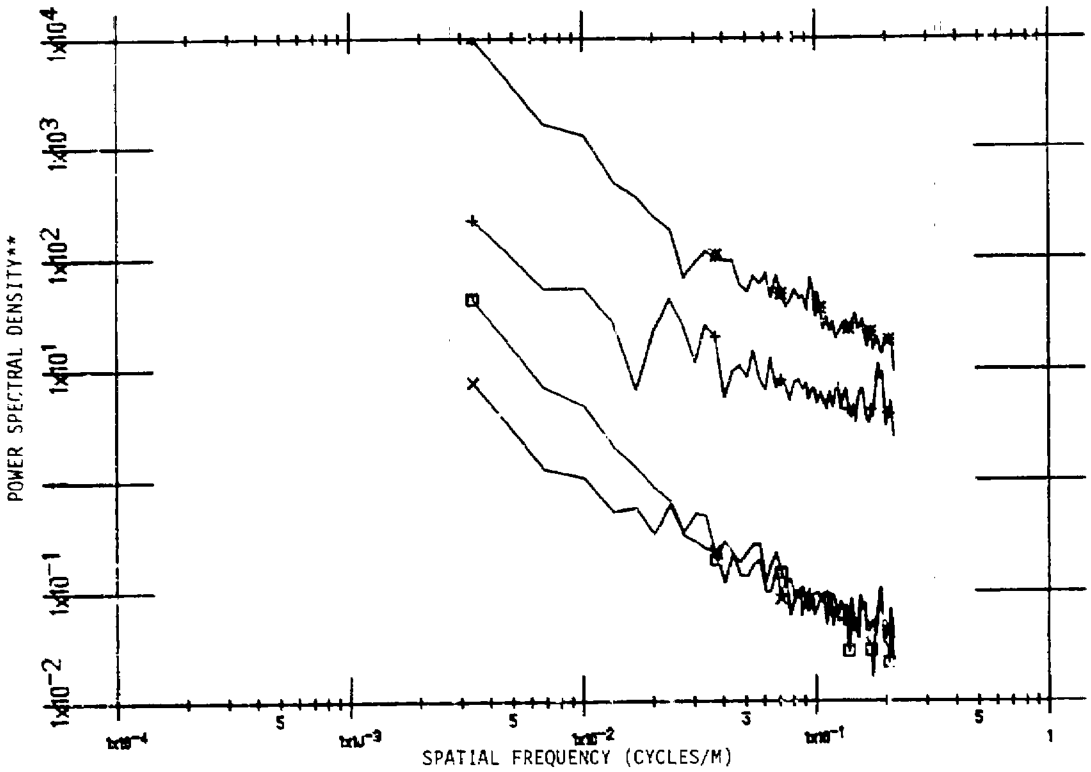
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2 and 4.5 to 5.5 μm bands.



Area: NVH1 CROSS-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA (Dry Lake)

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^{\circ}K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: NVH1 IN-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA (Dry Lake)

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.

PISGAH CRATER, CALIFORNIA*

Pertinent Scene and Flight Information

(Date of Flight: 30 October 1970)

*For specific discussions of these and associated data for this scenery, refer to Reference 2.

PISGAH CRATER Data

Wavelength Bands:

8.0-10.9 μm, 9.4-12.1 μm, 11.3-13.5 μm

IFOV: 3.5 mrad (11.3-13.5); 21x28 $mrad^2$ (8.0-10.9, 9.4-12.1)

Altitude: 1000 ft

Depression Angle: 90°

Time: 0830 hrs

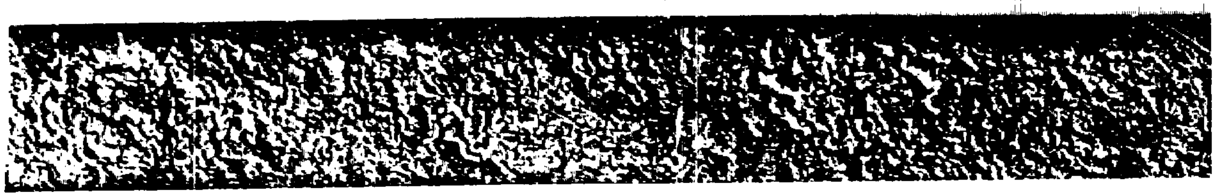
Flight Direction: South-Southeast

Ground Speed: ~200 $ft\text{-}sec^{-1}$

Area Covered (Approx.): 6950 ft long x 820 ft wide

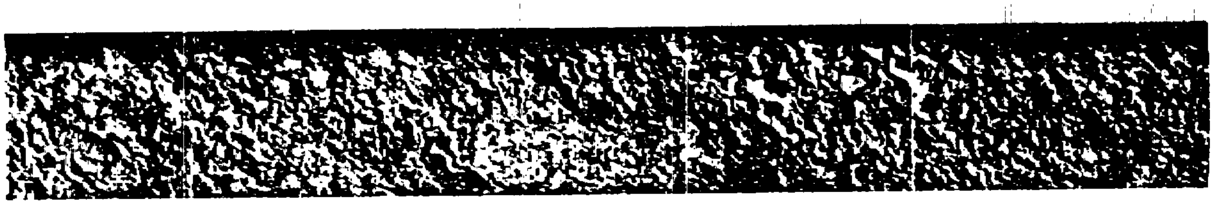
Meteorology: Visibility 50 mi; clear and bright, dry; cloud cover 10%

AERIAL PHOTOGRAPH - PISGAH CRATER



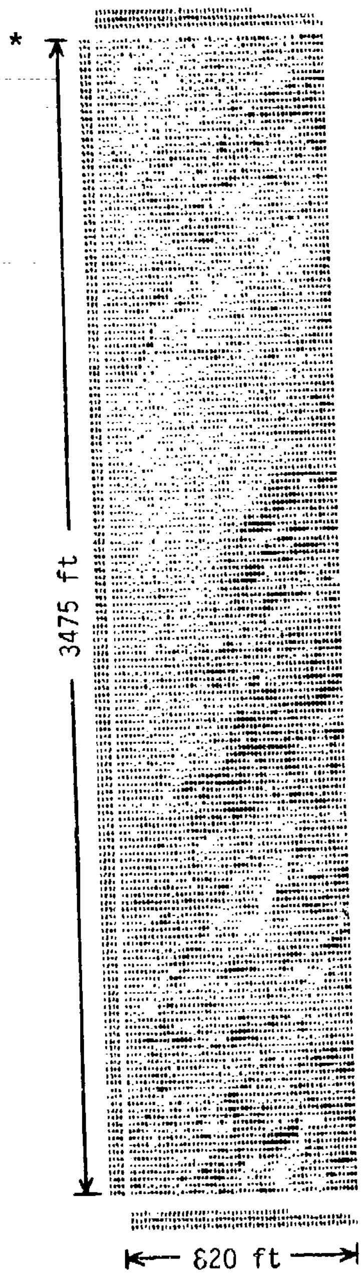
11.3 - 13.5 μm

8.0 - 10.9 μm



9.4 - 12.1 μm

LINE SCAN IMAGES PRODUCED FROM THE VARIOUS INFRARED CHANNELS OF PISGAH CRATER



GREYMAP OF PISGAH CRATER

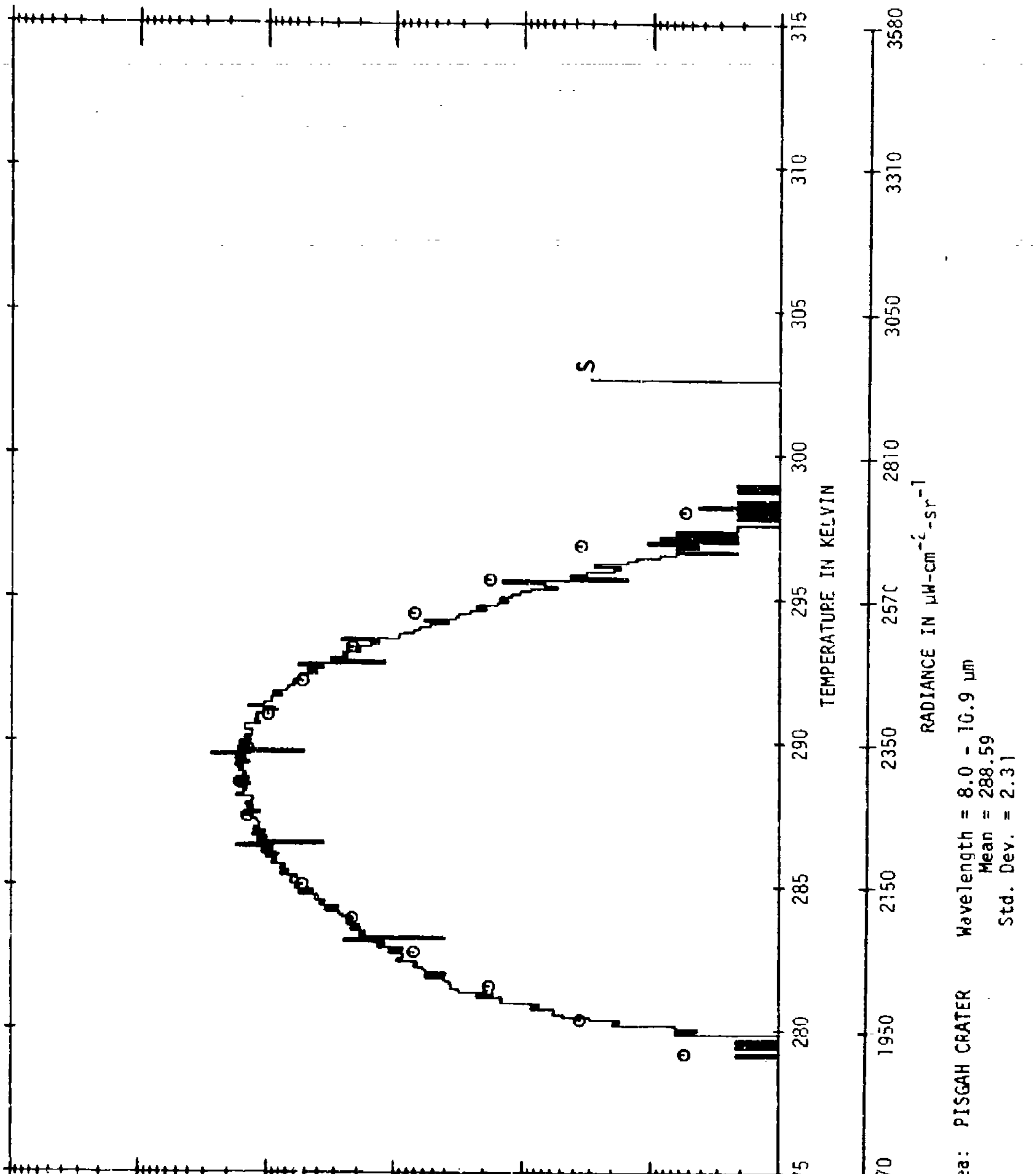
*(Note: Line range of scene analyzed was 1-1988; not completely shown here.)

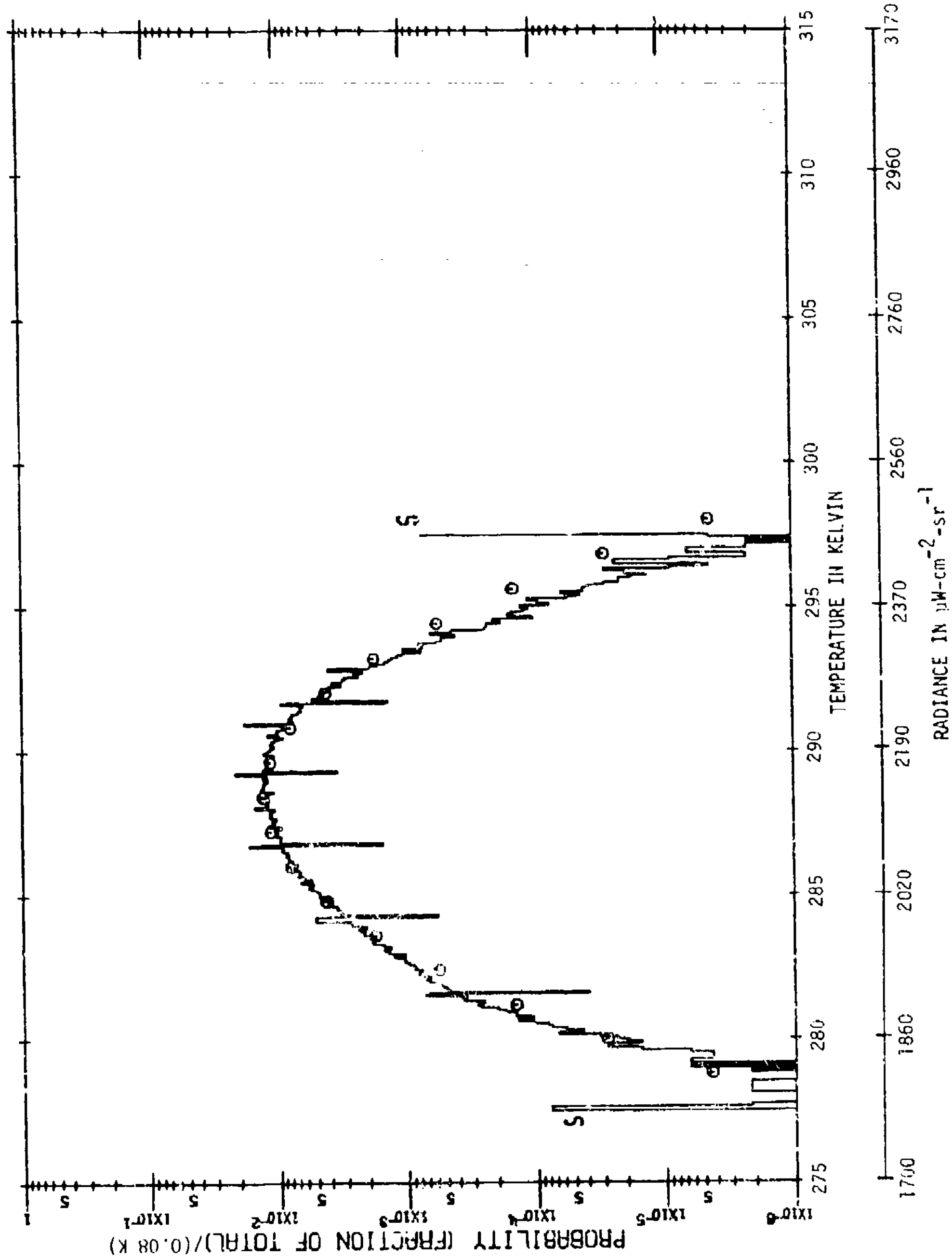
PISGAH CRATER, CALIFORNIA

Histograms*

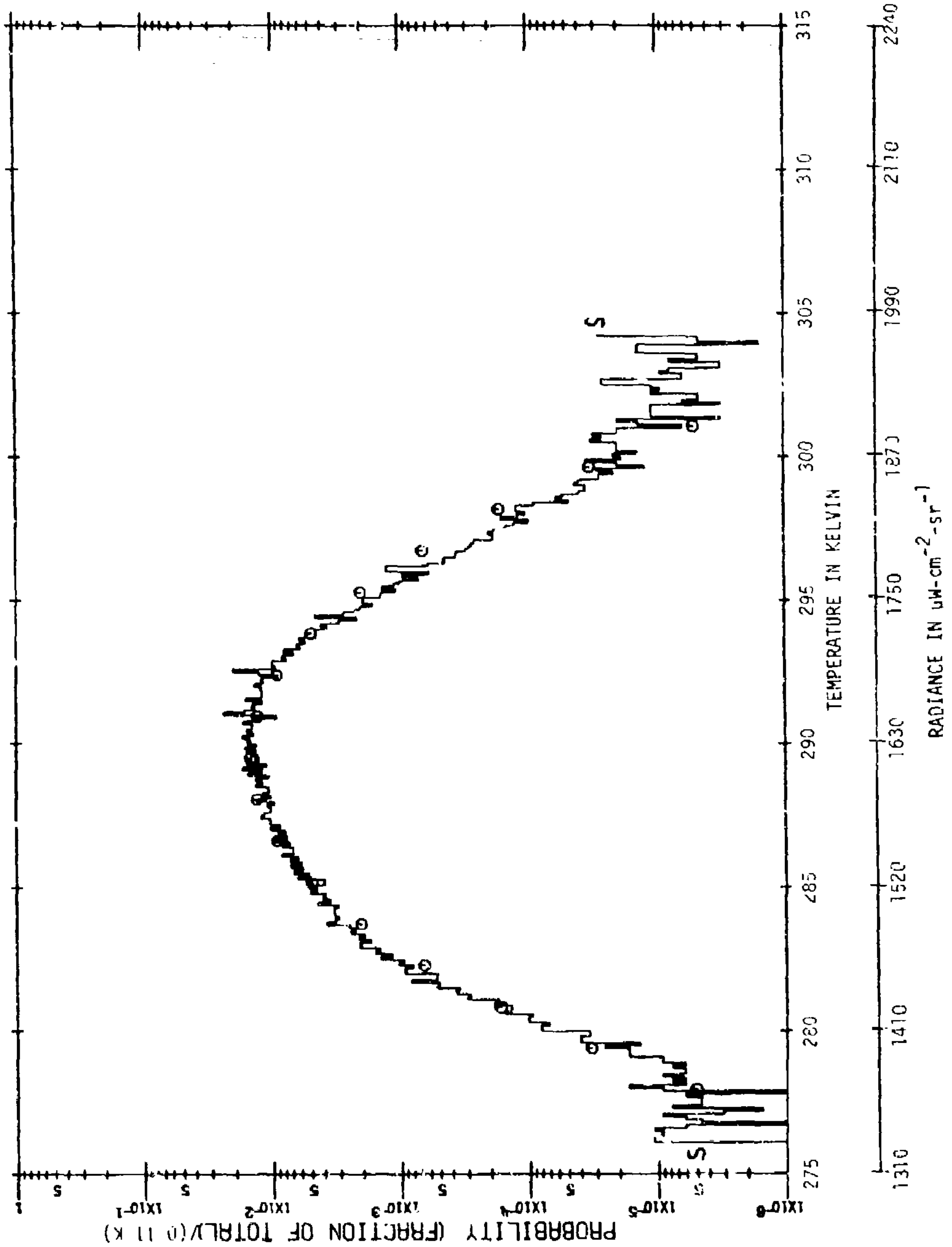
Spectral Bands: 8.0 - 10.9 μm
9.4 - 12.1 μm
11.3 - 13.5 μm

*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.


PROBABILITY (FRACTION OF TOTAL)/(0.10 K)
1
1X10-1
1X10-2
1X10-3
1X10-4
1X10-5
1X10-6
275
280
285
290
295
300
305
310
315
TEMPERATURE IN KELVIN
1770
1950
2150
2350
2570
2810
3050
3310
3580
RADIANCE IN μW-cm-2-sr-1
Area: PISGAH CRATER
Wavelength = 8.0 - 10.9 μm
Mean = 288.59
Std. Dev. = 2.31



Area: PISGAH CRATER   Wavelength = 9.4 - 12.1 μm
Mean = 288.42
Std. Dev. = 2.40



Area: PISGAH CRATER
Wavelength = 11.3 - 13.5 μm
Mean = 289.51
Std. Dev. = 2.83

ERIM

PISCAH CRATER, CALIFORNIA

Means and Standard Deviations for Spectral Bands

Spectral Bands:	Channel 1:	8.0 - 10.9 μm (°K)
	Channel 2:	9.4 - 12.1 μm (°K)
	Channel 4:	11.3 - 13.5 μm (°K)

PISGAH CRATER

Number of Subregions = 1

Pixel Subarea Divisions at: 1 328

Line Subarea Divisions at: 1 1986

Line Increment Used = 1

Pixel Increment Used = 1

Channels: 1(8.0 - 10.9 μm)
2(9.4 - 12.1 μm)
4(11.3 - 13.5 μm)

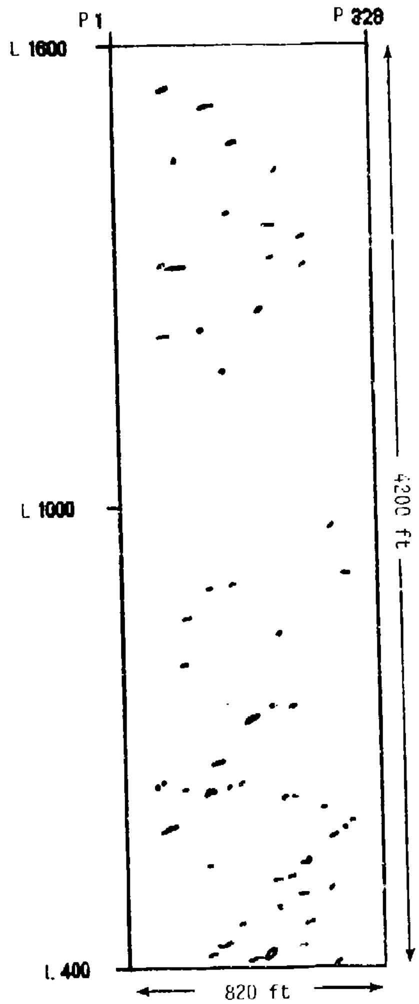
Channels	1	2	4
Mean	2.8859E+02	2.8841E+02	2.8951E+02
St. Dev.	2.3106E+00	2.3612E+00	2.8894E+00
Total Points	460743	460743	650076

ERIM

PISGAH CRATER, CALIFORNIA

Ellipse Statistics

Spectral Band: 11.3 - 13.5 μm



Area: PISGAH CRATER (Wavelength = 11.3 - 13.5 μm)
Temperature Threshold = Mean + 2.22 σ
Mean = 289.51 Kelvin
Std. Dev. = σ = 2.89 Kelvin
EQUIVALENT ELLIPTICAL AREAS

PISGAH CRATER

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.22 σ

Wavelength = 11.3 - 13.5 μm

Mean = 289.51 Kelvin

σ = 2.89 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
3.0	TO	5.0	101
5.0	TO	10.0	52
10.0	TO	15.0	22
15.0	TO	20.0	2
20.0	TO	25.0	7
25.0	TO	30.0	2
30.0	TO	35.0	1
35.0	TO	40.0	1
40.0	TO	45.0	3
45.0	TO	50.0	2
50.0	TO	75.0	1
75.0	TO	100.0	1
100.0	TO	150.0	2
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 197

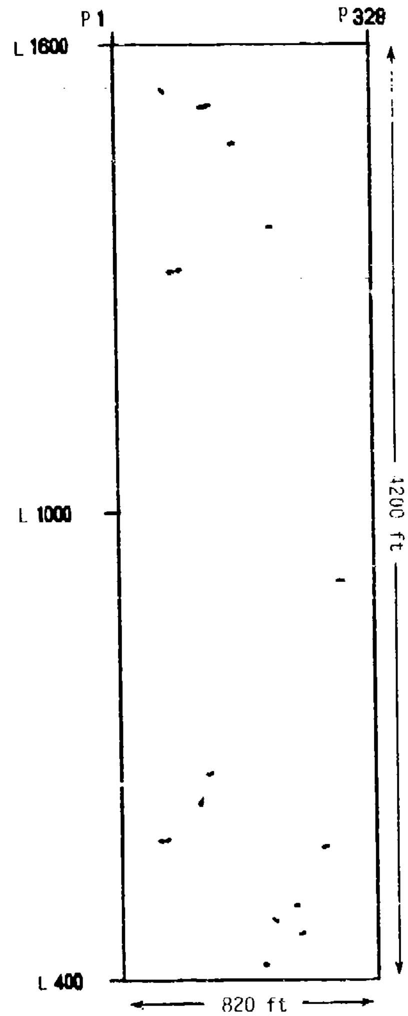
576 FEATURES WITH AREAS LESS THAN 3.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	46
10	TO	12	32	TO	[illegible]	41
12	TO	14	39	TO	45	36
14	TO	16	45	TO	52	21
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	10
20	TO	22	65	TO	72	3
22	TO	24	72	TO	78	6
24	TO	26	78	TO	85	4
26	TO	28	85	TO	91	2
28	TO	30	91	TO	98	4
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	10
39	TO	45	127	TO	147	3
45	TO	55	147	TO	180	3
55	TO	71	180	TO	232	4
71	TO	100	232	TO	328	2
	OVER	100		OVER	328	2

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	5
1.2	TO	1.3	5
1.3	TO	1.4	47
1.4	TO	1.5	30
1.5	TO	1.6	22
1.6	TO	1.7	27
1.7	TO	1.8	7
1.8	TO	1.9	4
1.9	TO	2.0	18
2.0	TO	2.4	19
2.4	TO	2.6	3
2.6	TO	2.8	5
2.8	TO	3.0	1
3.0	TO	3.5	2
3.5	TO	4.0	1
4.0	TO	4.5	0
	OVER	4.5	1



Area: PISGAH CRATER (Wavelength = 11.3 - 13.5 μm)

Temperature Threshold = Mean + 2.75

Mean = 239.51 Kelvin

Std. Dev. = σ = 2.89 Kelvin

EQUIVALENT ELLIPTICAL AREAS

PISGAH CRATER

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.75 σ

Wavelength = 11.3 - 13.5 μm

Mean = 289.51 Kelvin

σ = 2.89 Kelvin

SQUARE METERS	FREQUENCY
3.0 TO 5.0	26
5.0 TO 10.0	17
10.0 TO 15.0	3
15.0 TO 20.0	2
20.0 TO 25.0	0
25.0 TO 30.0	0
30.0 TO 35.0	0
35.0 TO 40.0	1
40.0 TO 45.0	0
45.0 TO 50.0	0
50.0 TO 75.0	0
75.0 TO 100.0	0
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 49

170 FEATURES WITH AREAS LESS THAN 3.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	13
10 TO 12	32 TO 39	11
12 TO 14	39 TO 45	7
14 TO 16	45 TO 52	3
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	10
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	1
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	2
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	1
71 TO 100	232 TO 328	0
OVER 100	OVER 328	0

BY SHAPE

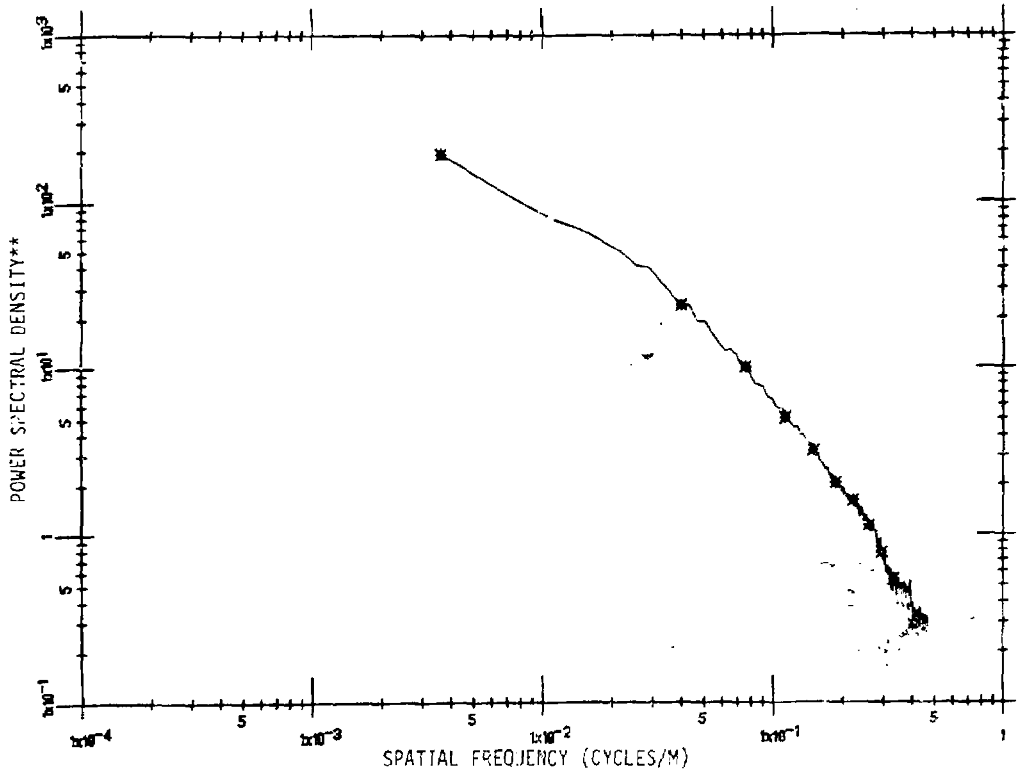
SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	3
1.3 TO 1.4	13
1.4 TO 1.5	3
1.5 TO 1.6	5
1.6 TO 1.7	8
1.7 TO 1.8	3
1.8 TO 1.9	6
1.9 TO 2.0	3
2.0 TO 2.4	3
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

ERIM

PISGAH CRATER, CALIFORNIA

Power Spectra

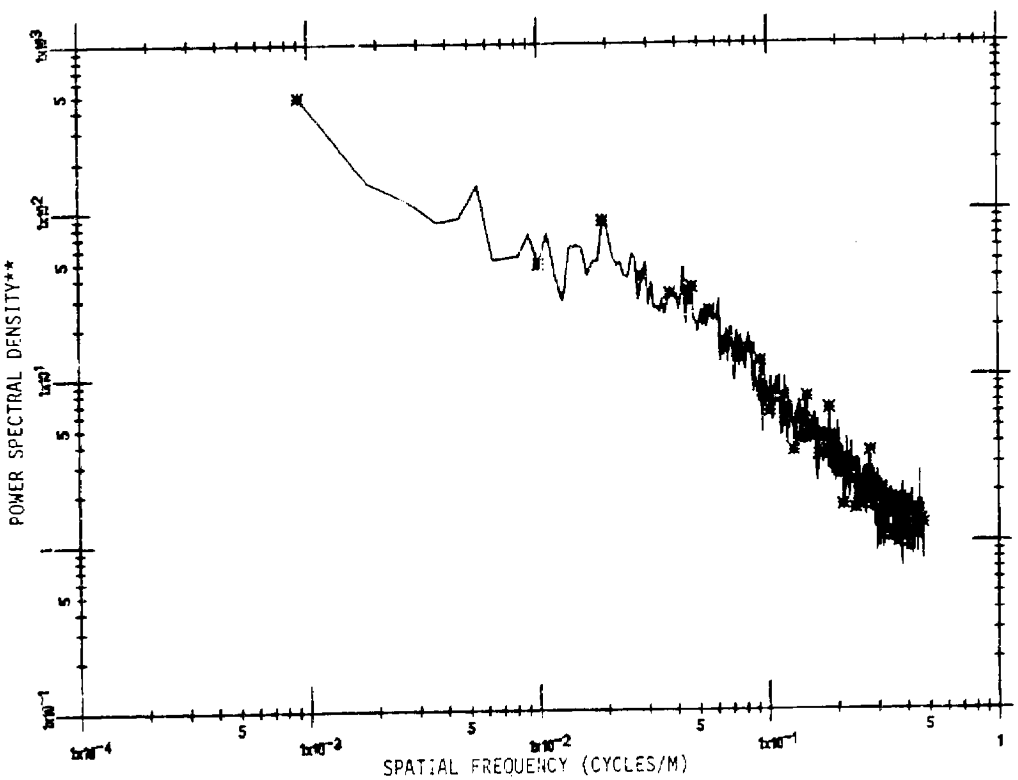
Spectral Band: 11.3 - 13.5 μm



Area: PISGAH CRATER CROSS-TRACK Wavelength = 11.3-13.5 (*)

POWER SPECTRA

**Power spectral density is $(^\circ K)^2$/cycle/meter for the 11.3 - 13.5 μm band.



Area: PISGAH CRATER IN-TRACK Wavelength = 11.3-13.5 (*)

POWER SPECTRA

**Power spectral density is $(°K)^2$/cycle/meter for the 11.3 - 13.5 um band.

ERIM

PORT HUENEME, CALIFORNIA*

Pertinent Scene and Flight Information

(Date of Flight: 7 March 1978)

*For specific discussions of these and associated data for this scenery, refer to Reference 4.

HUME1 Data

Wavelength Bands:
2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm, 9.0-11.4 μm

IFOV: 2.5 mrad

Altitude: 1750 ft — Depression Angle: 90°

Time: 1215 hrs — Flight Direction: West

Ground Speed: 202 ft-sec^{-1}

Area Covered (Approx.):
Total) 6350 ft long x 2800 ft wide

HUME2 Data

Wavelength Bands:
2.0-2.6 μm, 3.0-4.2 μm, 4.5-5.5 μm, 9.0-11.4 μm

IFOV: 2.5 mrad

Altitude: 1000 ft — Depression Angle: 35°

Time: 1420 hrs — Flight Direction: West

Ground Speed: 202 ft-sec^{-1}

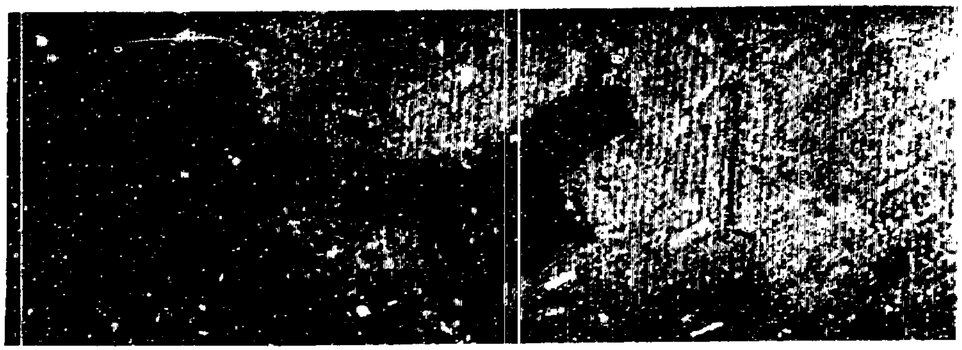
Area Covered (Approx.):
Glints) 1600 ft long x 900 ft wide (sun glint on water)

Meteorology (HUME1 and HUME2): Visibility > 15 mi; slight haze; high scattered clouds; water calm, slight rolling waves.

AERIAL PHOTOGRAPH - PORT HUENEME

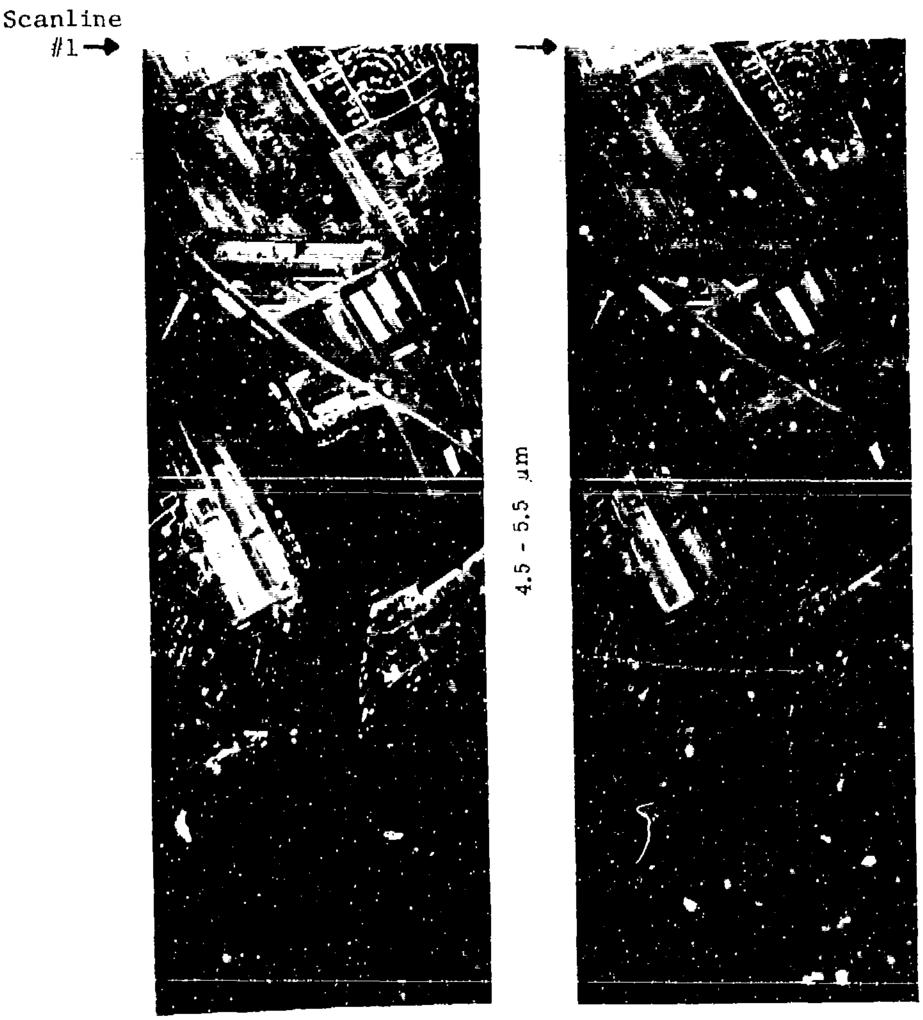
Scanline #1 →

2.0 - 2.6 μm

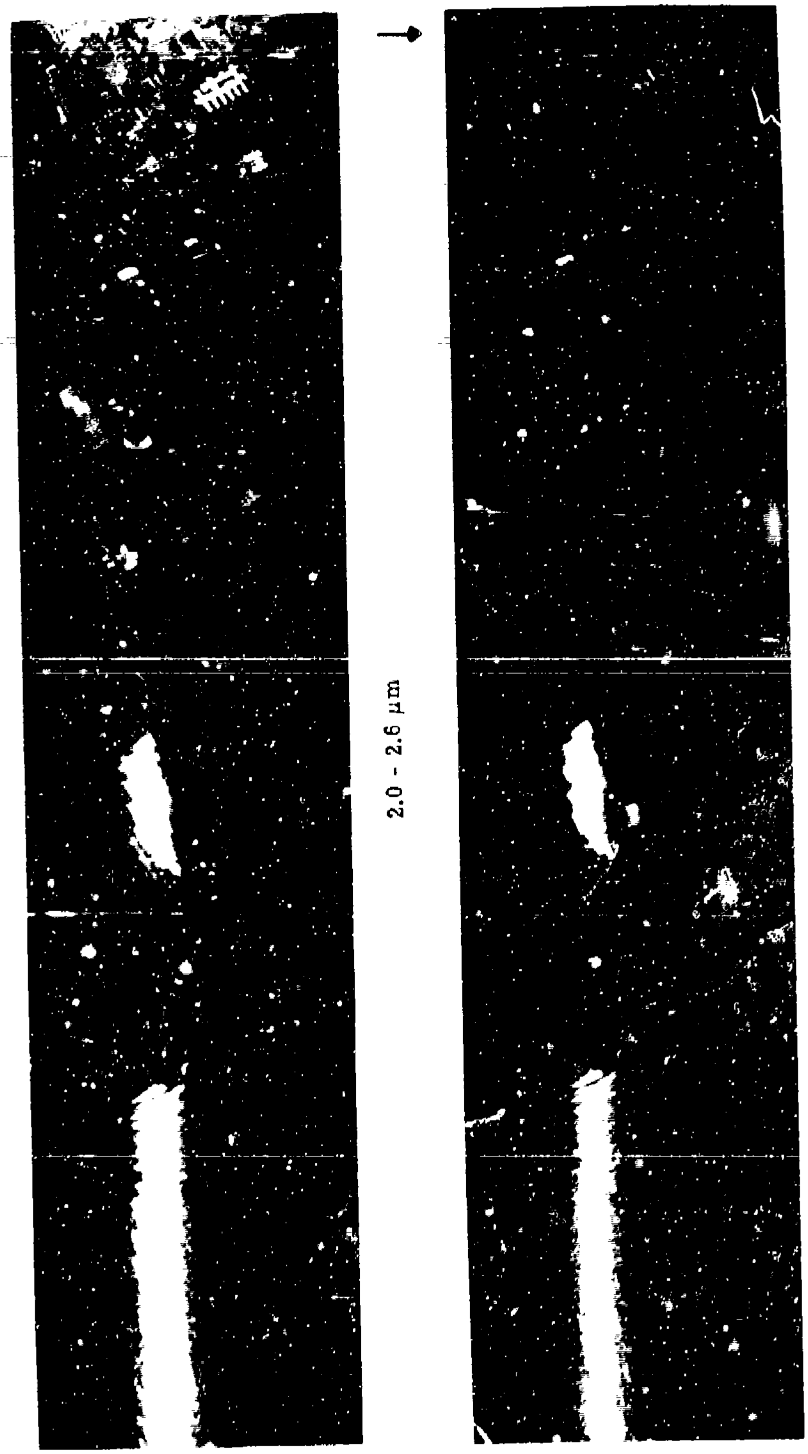


3.0 - 4.2 μm

PORT HUENEME IMAGERY - 90° DEPRESSION (HUME1)

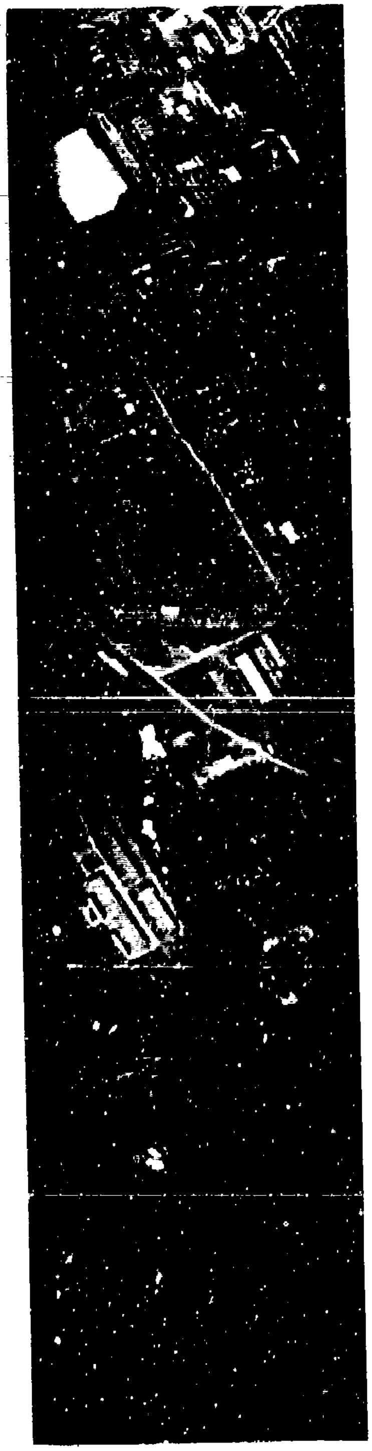


PORT HUENEME IMAGERY - 90° DEPRESSION (HUME1)



PORT HUENEME IMAGERY - 35° DEPRESSION (HUME2)

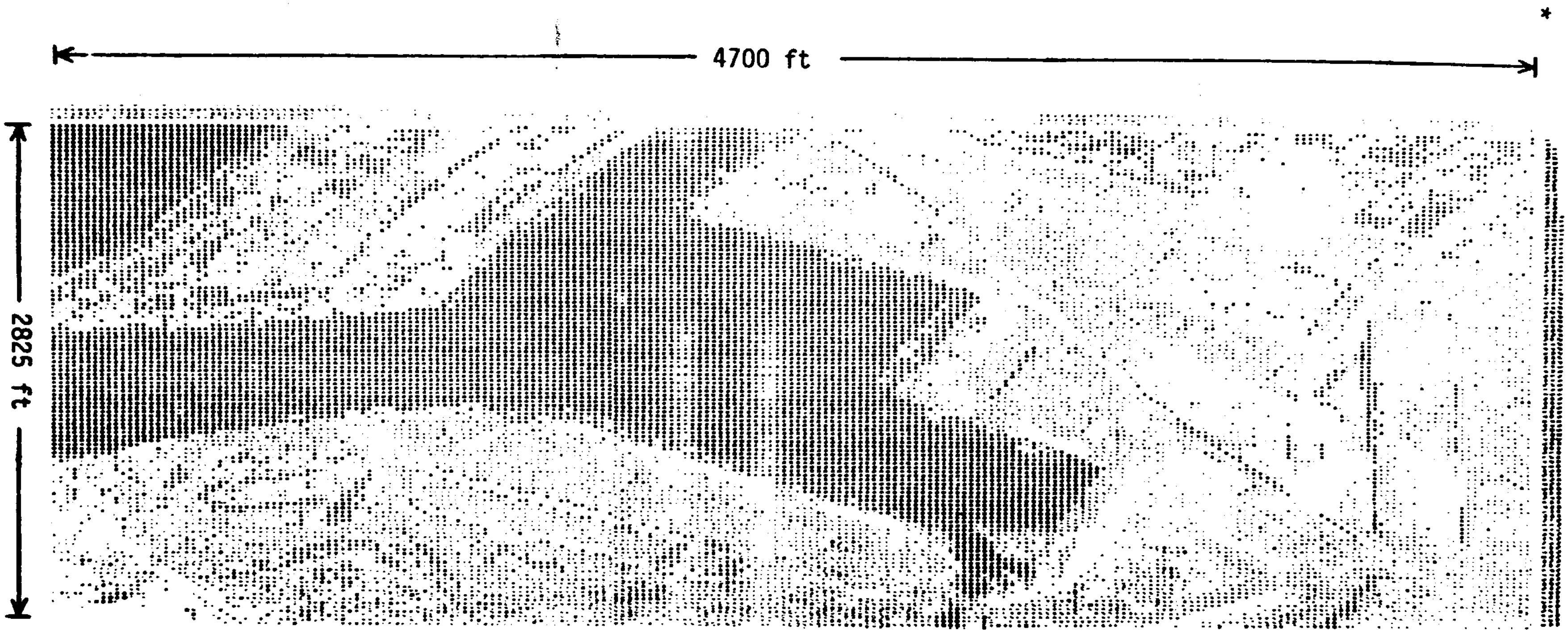
Scanline
#1→



4.5 - 5.5 μm

9.0 - 11.4 μm

PORT HUENEME IMAGERY - 35° DEPRESSION (HUME2)



HUME1 GREYMAP (Note: This is a mirror image of photographic imagery.)

*(Note: Line range of scene analyzed was 101-1550; not completely shown here.)

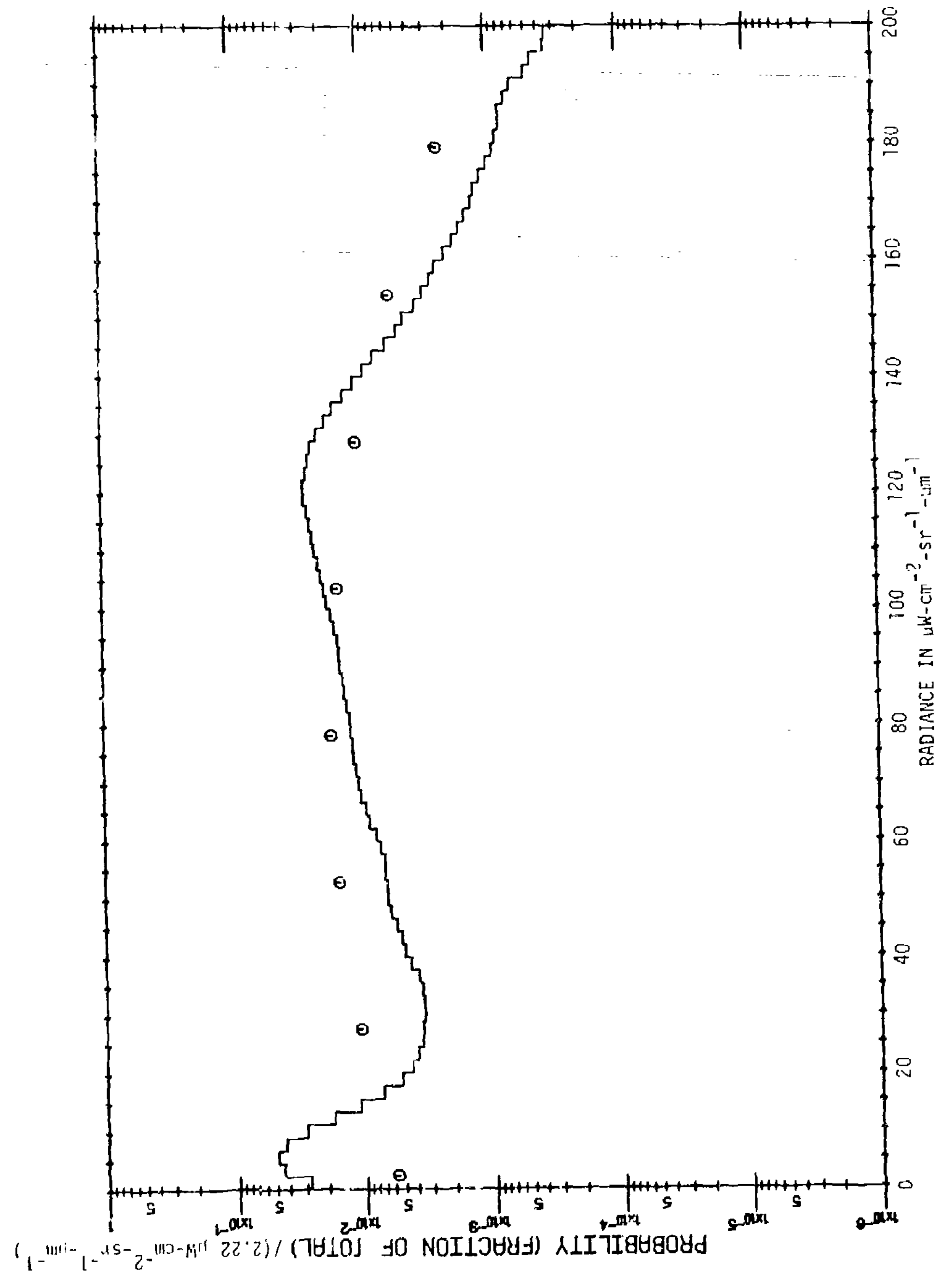
HUME2 GREYMAP (Note: This is a mirror image of photographic imagery.)

PORT HUENEME, CALIFORNIA

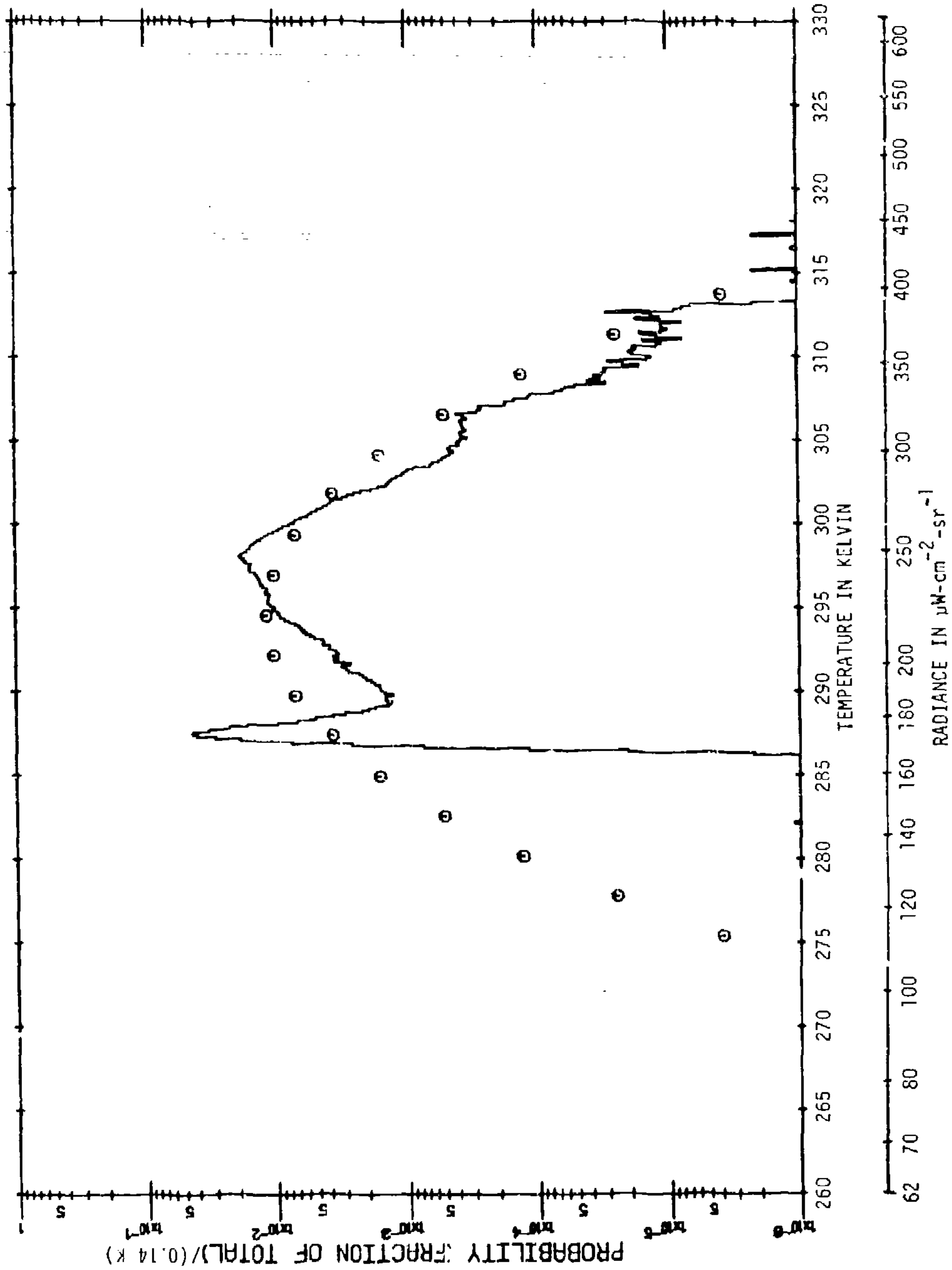
Histograms*

Spectral Bands: 2.0 - 2.6 μm
3.0 - 4.2 μm
4.5 - 5.5 μm
9.0 - 11.4 μm

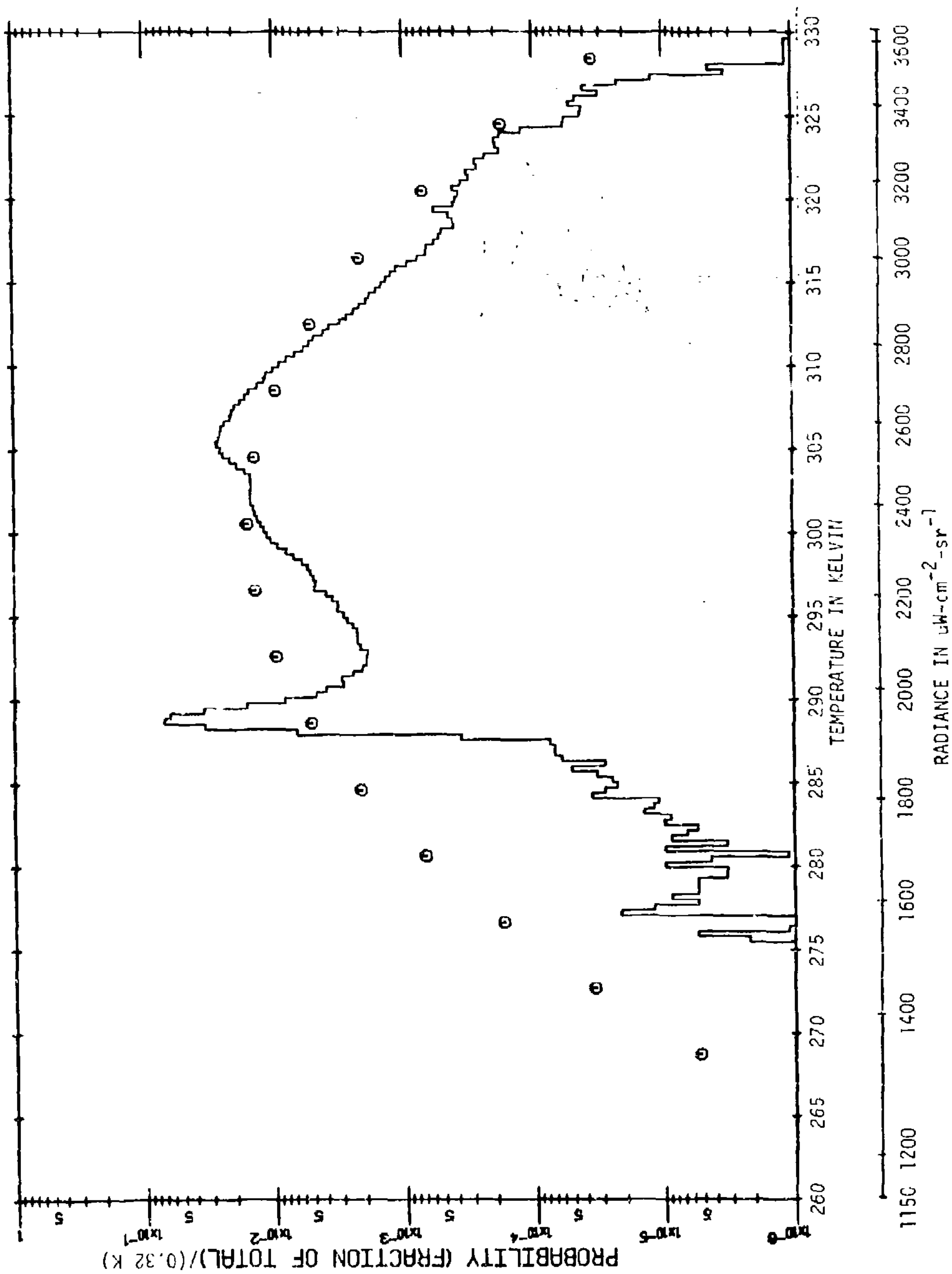
*Circles define a Gaussian curve with the same mean and standard deviation as the actual histogram. An "S" on some curves indicates saturation. Because of limits on gain settings some values may exist beyond the digital limits of 0 and 255, the digital dynamic range of the data processing.



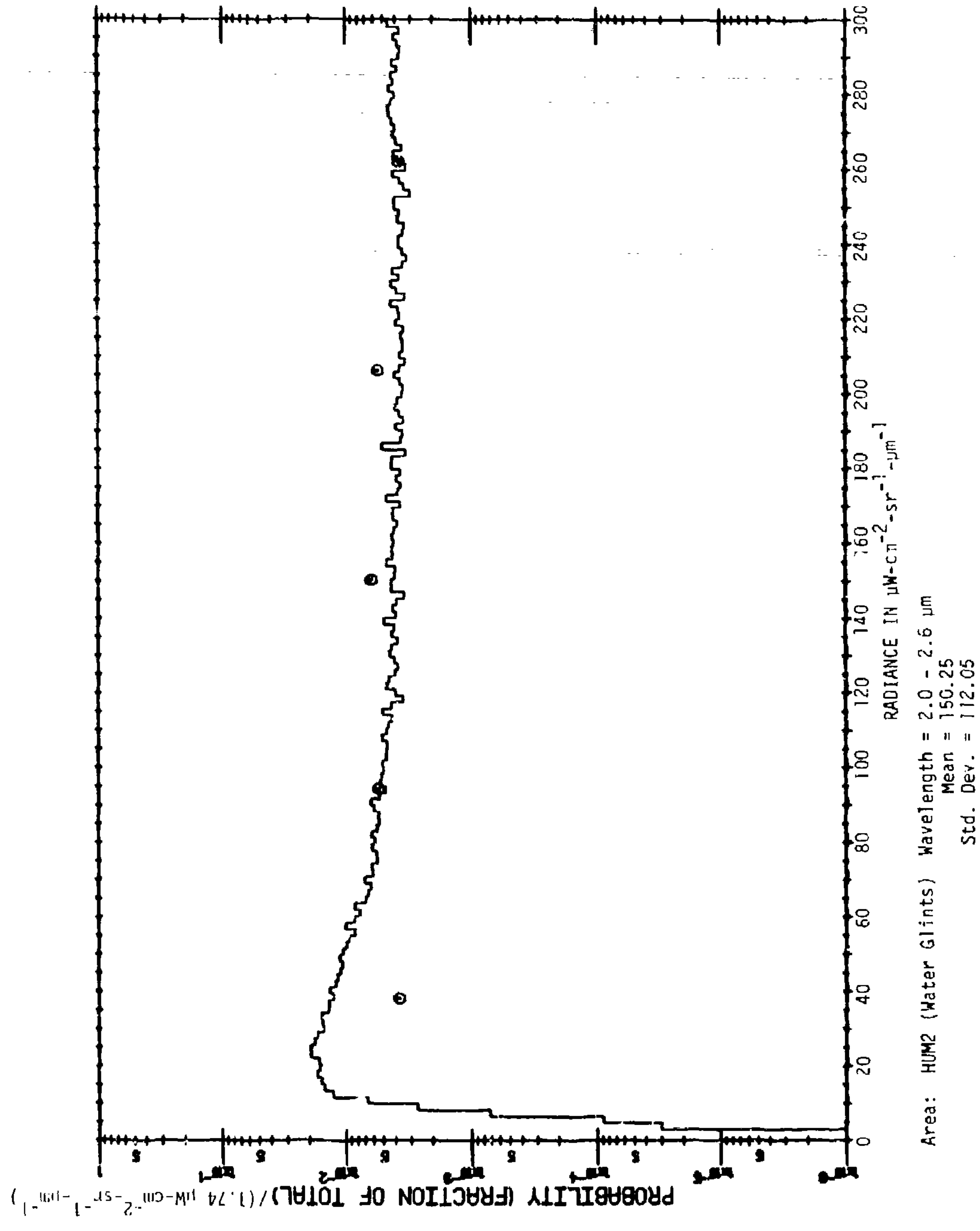
Area: HUM1 (Lines 101-1550) Wavelength = 2.0 - 2.6 µm
Mean = 78.13
Std. Dev. = 50.52



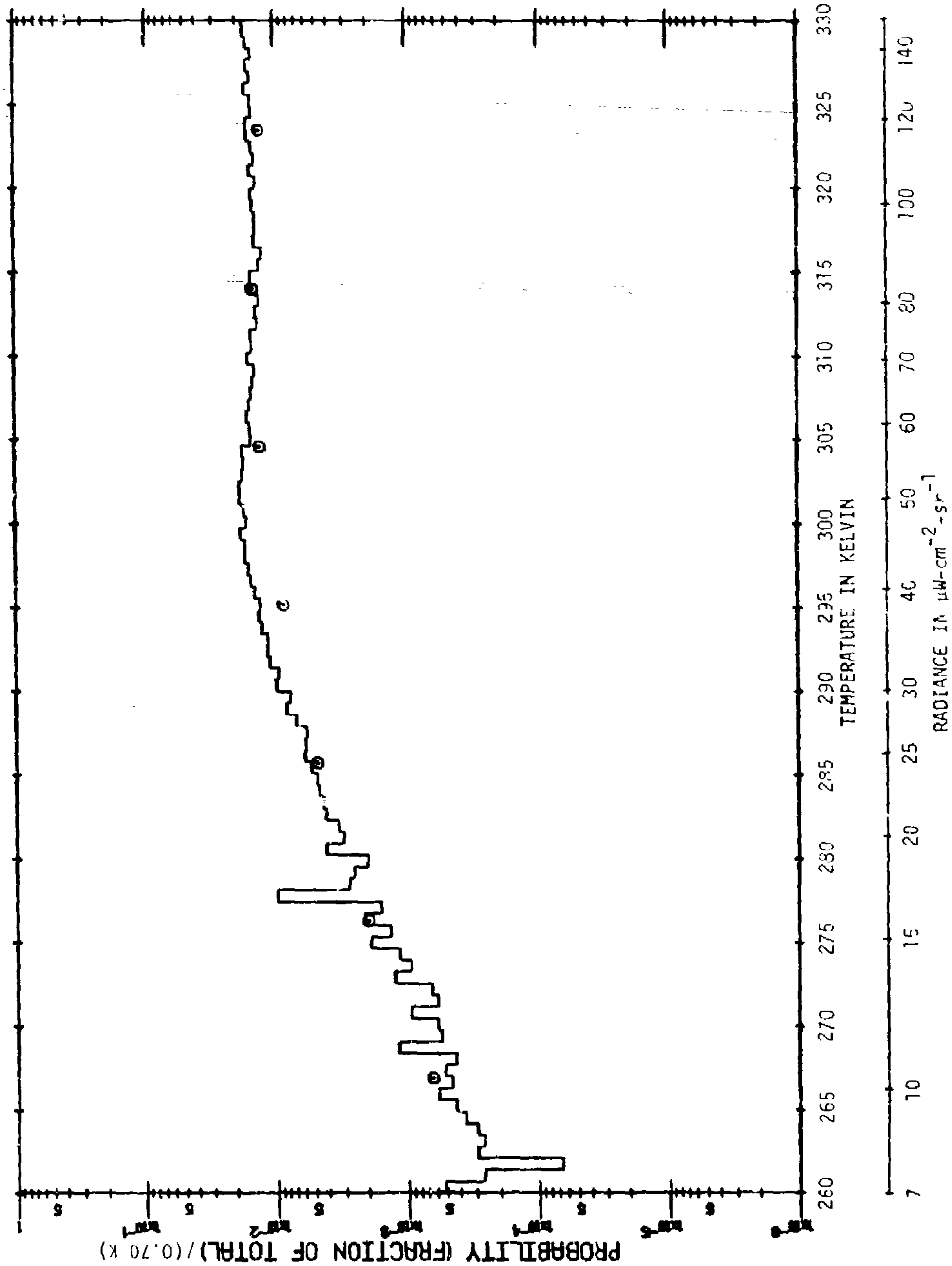
Area: HUM1 (Lines 101-1550) Wavelength = 4.5 - 5.5 μm
Mean = 294.54
Std. Dev. = 4.79



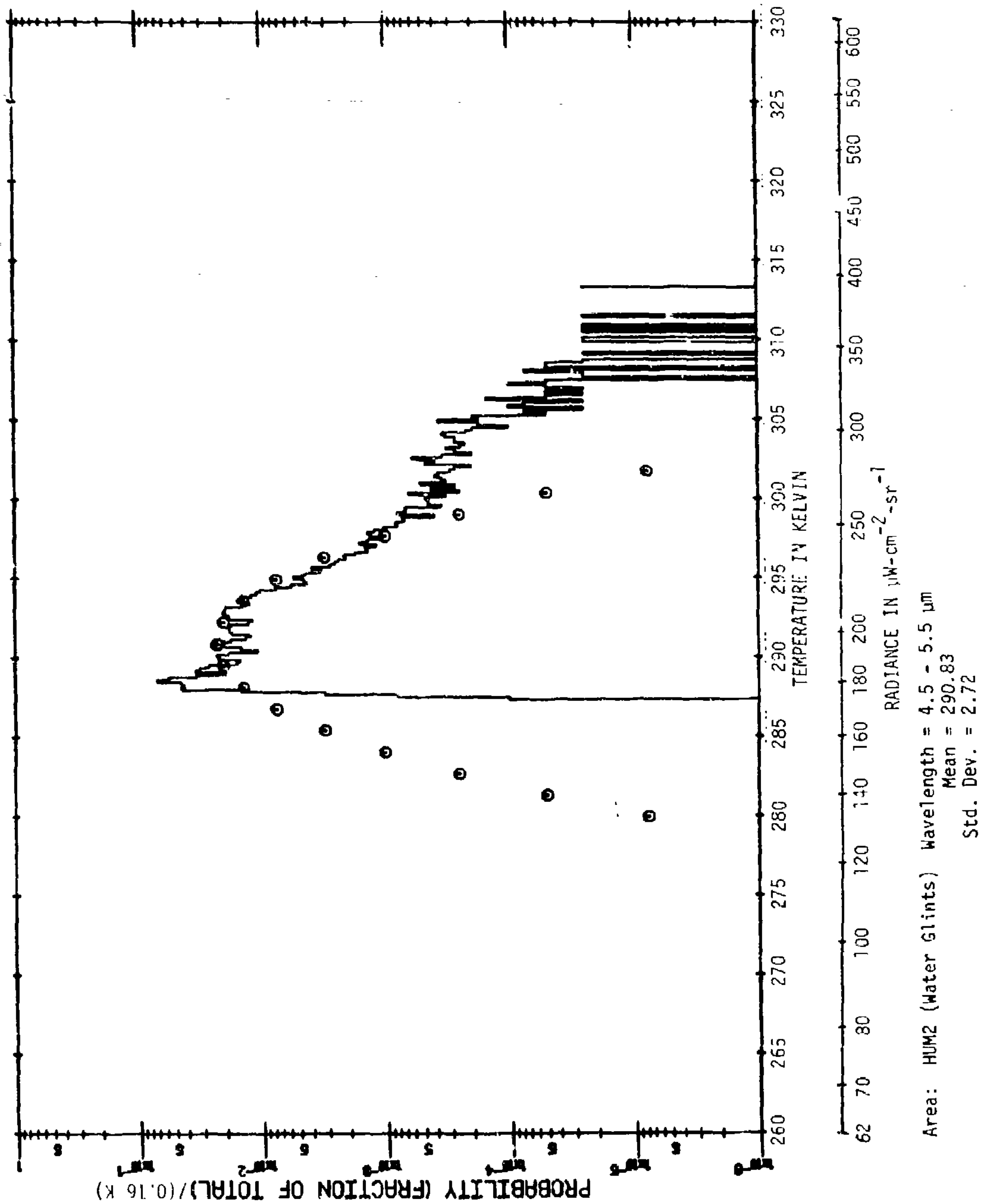
Area: HUM1 (Lines 101-1550) Wavelength = 9.0 - 11.4 μm
Mean = 300.54
Std. Dev. = 7.96



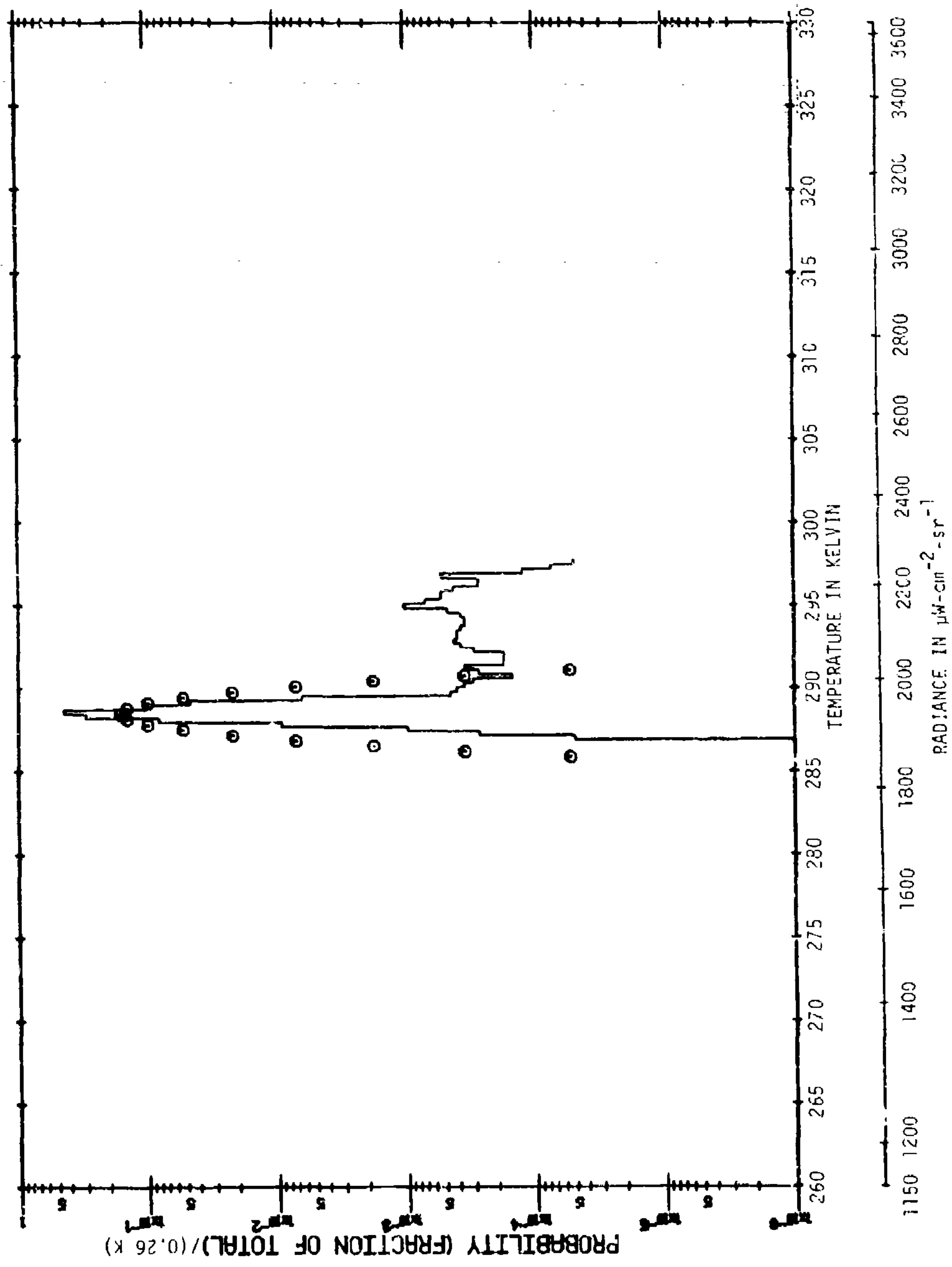
RADIANCE IN μW-cm^-2-sr^-1-μm^-1
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
PROBABILITY (FRACTION OF TOTAL)/(1.74 μW-cm^-2-sr^-1-μm^-1)
Area: HUM2 (Water Glints) Wavelength = 2.0 - 2.6 μm
Mean = 150.25
Std. Dev. = 112.05



Area: HJM2 (Water Glints) Wavelength = 3.0 - 4.2 μm
Mean = 314.05
Std. Dev. = 18.86



PROBABILITY (FRACTION OF TOTAL)/(0.16 K)
TEMPERATURE IN KELVIN
RADIANCE IN μW-cm-2-sr-1
Area: HUM2 (Water Glints) Wavelength = 4.5 - 5.5 μm
Mean = 290.83
Std. Dev. = 2.72



Area: HUM2 (Water Glints) Wavelength = 9.0 - 11.4 μm
Mean = 288.46
Std. Dev. = 0.65

PORT HUENEME, CALIFORNIA

Means and Standard Deviations for Spectral Bands

Correlations Between Spectral Bands*

Spectral Bands:	Channel 6:	2.0 - 2.6 μm ($\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$)
	Channel 10:	3.0 - 4.2 μm (°K)
	Channel 11:	4.5 - 5.5 μm (°K)
	Channel 12:	9.0 - 11.4 μm (°K)

*Because of the relatively small temperature changes in the scenery, there is a nearly linear relationship between the temperature and radiance statistics for the thermal channels. It is pertinent, therefore, to compute correlations between radiance and temperature channels.

HUME1

TOTAL SCENE

Number of Subregions = 1

Pixel Subarea Divisions at: 10 636

Line Subarea Divisions at: 101 1550

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 6 (2.0 - 2.6 μm)
11 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

Correlation	6	11	12
6	1.000		
11	0.791	1.000	
12	0.767	0.921	1.000

Channels	6	11	12
Mean	7.8128E+01	2.9454E+02	3.0054E+02
St. Dev.	5.0523E+01	4.7889E+00	7.9584E+00
Total Pts.	907700.	907700.	907700.

ERIM

HUME2

GLINTS

Number of Subregions = 1

Pixel Subarea Divisions at: 301 500

Line Subarea Divisions at: 1351 1550

Line Increment Used = 1

Pixel Increment Used = 1

Correlation Channels: 6 (2.0 - 2.6 μm)
10 (3.0 - 4.2 μm)
11 (4.5 - 5.5 μm)
12 (9.0 - 11.4 μm)

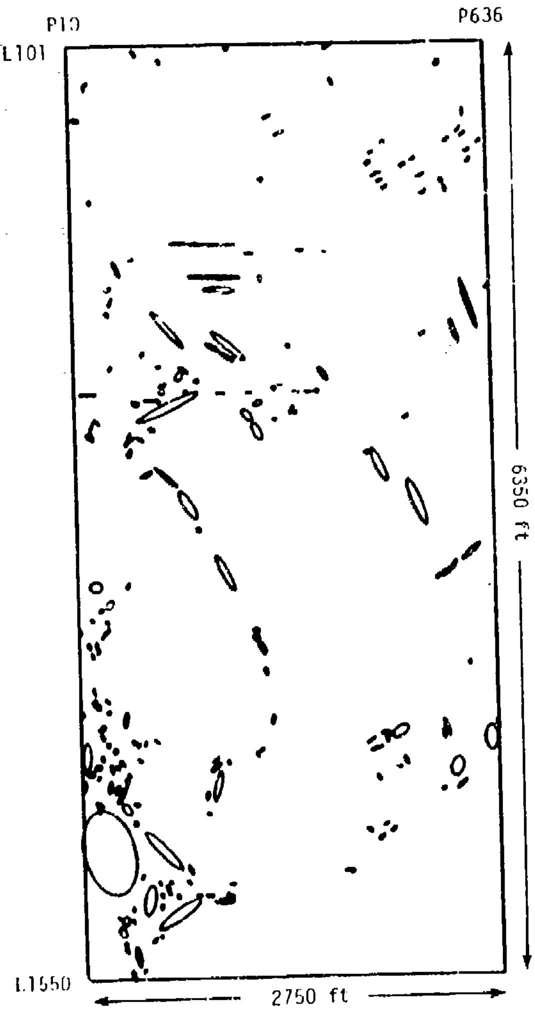
Correlation	6	10	11	12
6	1.000			
10	0.846	1.000		
11	0.892	0.683	1.000	
12	-0.094	-0.113	0.049	1.000

Channels	6	10	11	12
Mean	1.5025E+02	3.1405E+02	2.9083E+02	2.8846E+02
St. Dev.	1.1205E+02	1.3863E+01	2.7197E+00	6.4991E-01
Total Pts.	39800.	39800.	39800	3980

PORT HUENEME, CALIFORNIA

Ellipse Statistics

Spectral Bands: 2.0 - 2.6 μm
3.0 - 4.2 μm
4.5 - 5.5 μm
9.0 - 11.4 μm



Area: HUM1 (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 1.50 σ

Mean = 78.13 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 50.52 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.50 σ

Wavelength = 2.0 - 2.6 μm

Mean = 78.1[illegible] $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 50.52 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	42
10.0	TO	15.0	78
15.0	TO	20.0	46
20.0	TO	25.0	23
25.0	TO	30.0	16
30.0	TO	35.0	20
35.0	TO	40.0	14
40.0	TO	45.0	11
45.0	TO	50.0	11
50.0	TO	75.0	22
75.0	TO	100.0	16
100.0	TO	150.0	16
150.0	TO	200.0	6
200.0	TO	250.0	8
250.0	TO	300.0	2
300.0	TO	400.0	5
400.0	TO	500.0	3
	OVER	500.0	18

TOTAL NUMBER OF ELLIPTICAL AREAS = 355

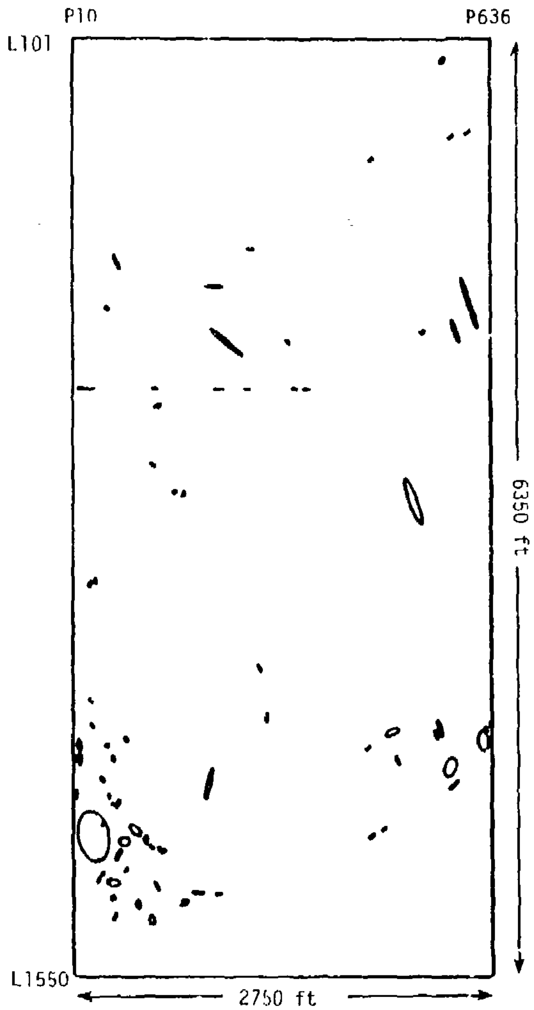
854 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	15
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	27
17	TO	20	55	TO	65	36
20	TO	22	65	TO	72	34
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	23
26	TO	28	85	TO	91	22
28	TO	30	91	TO	98	20
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	45
39	TO	45	127	TO	147	22
45	TO	55	147	TO	180	23
55	TO	71	180	TO	232	18
71	TO	100	232	TO	328	21
	OVER	100		OVER	328	49

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	6
1.2	TO	1.3	17
1.3	TO	1.4	26
1.4	TO	1.5	22
1.5	TO	1.6	51
1.6	TO	1.7	26
1.7	TO	1.8	38
1.8	TO	1.9	22
1.9	TO	2.0	22
2.0	TO	2.4	58
2.4	TO	2.6	14
2.6	TO	2.8	17
2.8	TO	3.0	9
3.0	TO	3.5	12
3.5	TO	4.0	8
4.0	TO	4.5	1
	OVER	4.5	6



Area: HUM1 (Wavelength = 2.0 - 2.6 μm)
Radiance Threshold = Mean + 2.0 σ
Mean = 78.13 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 50.52 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.0 σ

Wavelength = 2.0 - 2.6 μm

Mean = 78.13 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 50.52 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	14
10.0 TO 15.0	21
15.0 TO 20.0	11
20.0 TO 25.0	12
25.0 TO 30.0	6
30.0 TO 35.0	9
35.0 TO 40.0	6
40.0 TO 45.0	5
45.0 TO 50.0	3
50.0 TO 75.0	7
75.0 TO 100.0	3
100.0 TO 150.0	3
150.0 TO 200.0	2
200.0 TO 250.0	1
250.0 TO 300.0	2
300.0 TO 400.0	2
400.0 TO 500.0	2
OVER 500.0	5

TOTAL NUMBER OF ELLIPTICAL AREAS = 114

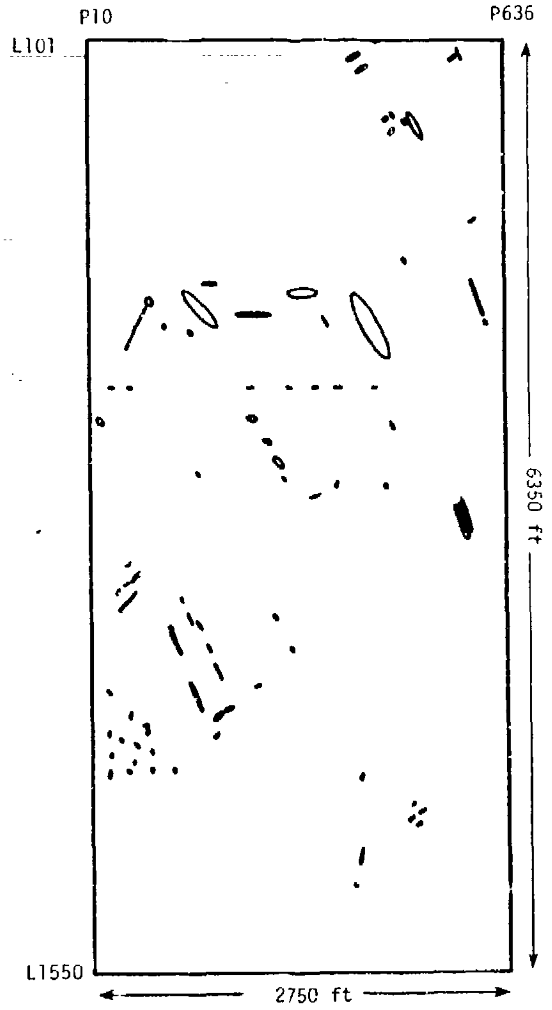
358 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	2
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	9
17 TO 20	55 TO 65	12
20 TO 22	65 TO 72	15
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	8
26 TO 28	85 TO 91	4
28 TO 30	91 TO 98	6
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	17
39 TO 45	127 TO 147	8
45 TO 55	147 TO 180	10
55 TO 71	180 TO 232	3
71 TO 100	232 TO 328	7
OVER 100	OVER 328	13

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	3
1.3 TO 1.4	8
1.4 TO 1.5	7
1.5 TO 1.6	18
1.6 TO 1.7	15
1.7 TO 1.8	13
1.8 TO 1.9	9
1.9 TO 2.0	5
2.0 TO 2.4	23
2.4 TO 2.6	2
2.6 TO 2.8	5
2.8 TO 3.0	2
3.0 TO 3.5	3
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	1



Area: HUM1 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 294.54 Kelvin
Std. Dev. = σ = 4.79 Kelvin
EQUIVALENT ELLIPTICAL AREAS

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 4.5 - 5.5 μm
Mean = 294.54 Kelvin
σ = 4.79 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	21
10.0 TO	15.0	35
15.0 TO	20.0	19
20.0 TO	25.0	11
25.0 TO	30.0	8
30.0 TO	35.0	6
35.0 TO	40.0	6
40.0 TO	45.0	6
45.0 TO	50.0	3
50.0 TO	75.0	8
75.0 TO	100.0	3
100.0 TO	150.0	7
150.0 TO	200.0	6
200.0 TO	250.0	1
250.0 TO	300.0	2
300.0 TO	400.0	1
400.0 TO	500.0	2
OVER	500.0	4

TOTAL NUMBER OF ELLIPTICAL AREAS = 149

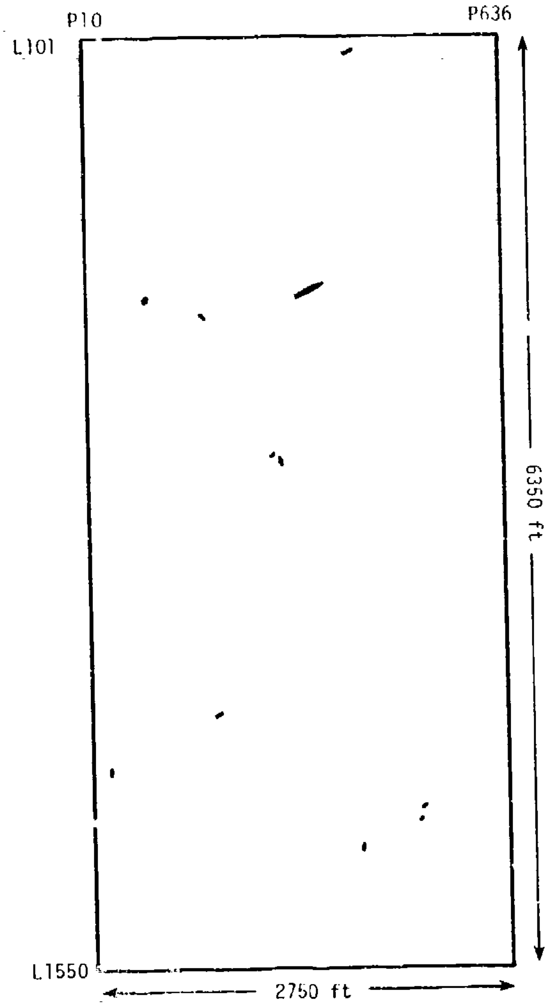
241 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	10
14 TO	16	45 TO	52	0
16 TO	17	52 TO	55	17
17 TO	20	55 TO	65	20
20 TO	22	65 TO	72	13
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	10
26 TO	28	85 TO	91	9
28 TO	30	91 TO	98	9
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	12
39 TO	45	127 TO	147	6
45 TO	55	147 TO	180	10
55 TO	71	180 TO	232	9
71 TO	100	232 TO	328	7
OVER	100	OVER	328	17

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	3
1.2 TO 1.3	10
1.3 TO 1.4	16
1.4 TO 1.5	12
1.5 TO 1.6	21
1.6 TO 1.7	16
1.7 TO 1.8	12
1.8 TO 1.9	11
1.9 TO 2.0	7
2.0 TO 2.4	19
2.4 TO 2.6	6
2.6 TO 2.8	4
2.8 TO 3.0	3
3.0 TO 3.5	6
3.5 TO 4.0	3
4.0 TO 4.5	0
OVER 4.5	0



Area: HUM1 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 294.54 Kelvin
Std. Dev. = σ = 4.79 Kelvin
EQUIVALENT ELLIPTICAL AREAS

ERIM

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 294.54 Kelvin

σ = 4.79 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	3
10.0	TO	15.0	4
15.0	TO	20.0	2
20.0	TO	25.0	1
25.0	TO	30.0	0
30.0	TO	35.0	4
35.0	TO	40.0	0
40.0	TO	45.0	0
45.0	TO	50.0	0
50.0	TO	75.0	2
75.0	TO	100.0	0
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 17

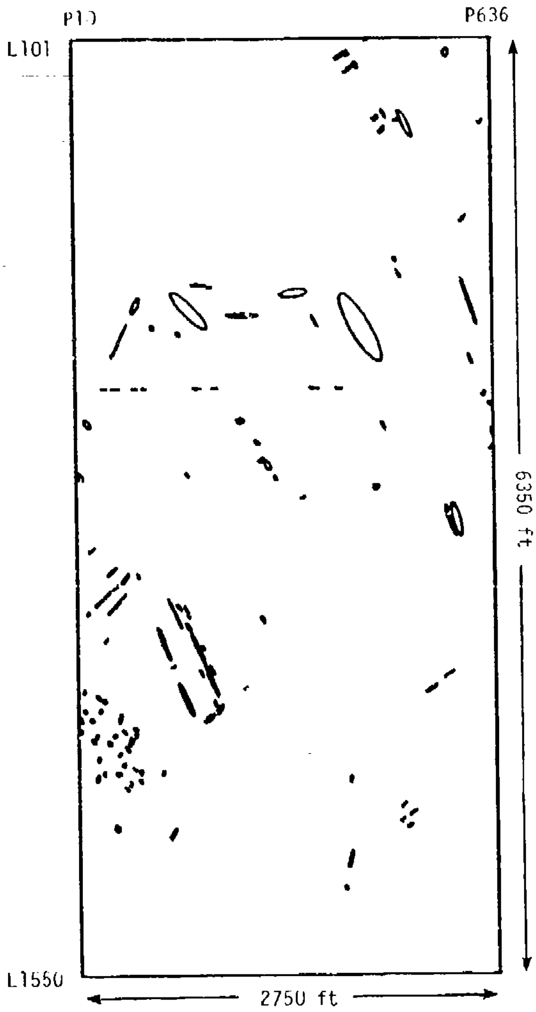
24 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	1
14	TO	16	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	3
20	TO	22	65	TO	72	1
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	0
32	TO	39	104	TO	127	3
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	3
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	0
OVER		100	OVER		328	1

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	1
1.3	TO	1.4	0
1.4	TO	1.5	1
1.5	TO	1.6	1
1.6	TO	1.7	2
1.7	TO	1.8	3
1.8	TO	1.9	0
1.9	TO	2.0	4
2.0	TO	2.4	3
2.4	TO	2.6	2
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	0
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: HUM1 (Wavelength = 9.0 - 11.4 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 300.54 Kelvin
Std. Dev. = σ = 7.96 Kelvin
EQUIVALENT ELLIPTICAL AREAS

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 300.54 Kelvin

σ = 7.96 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	26
10.0 TO	15.0	47
15.0 TO	20.0	25
20.0 TO	25.0	18
25.0 TO	30.0	7
30.0 TO	35.0	14
35.0 TO	40.0	7
40.0 TO	45.0	7
45.0 TO	50.0	3
50.0 TO	75.0	14
75.0 TO	100.0	2
100.0 TO	150.0	7
150.0 TO	200.0	7
200.0 TO	250.0	1
250.0 TO	300.0	3
300.0 TO	400.0	2
400.0 TO	500.0	2
OVER	500.0	5

TOTAL NUMBER OF ELLIPTICAL AREAS = 197

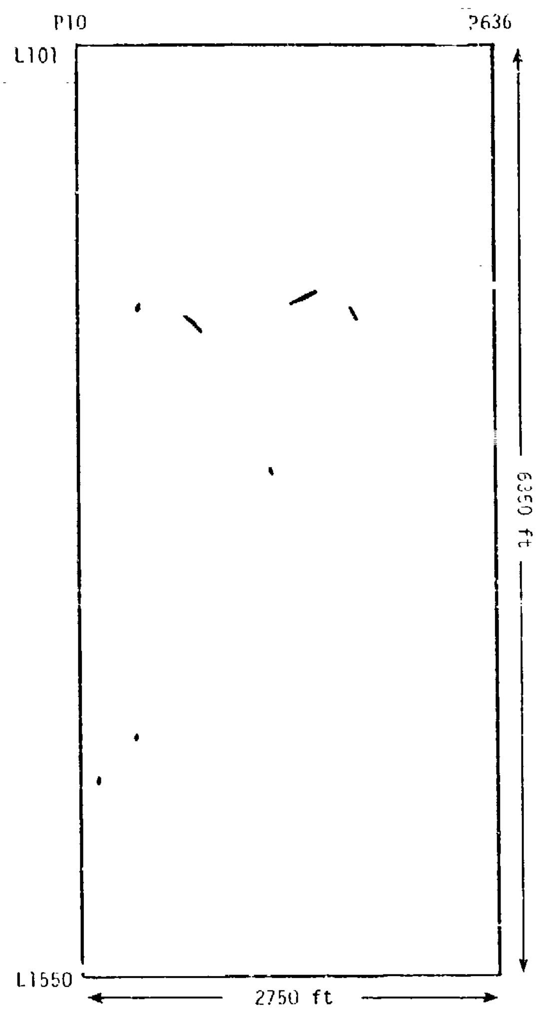
387 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	7
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	26
17 TO 20	55 TO 65	15
20 TO 22	65 TO 72	24
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	18
26 TO 28	85 TO 91	8
28 TO 30	91 TO 98	11
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	26
39 TO 45	127 TO 147	7
45 TO 55	147 TO 180	14
55 TO 71	180 TO 232	8
71 TO 100	232 TO 328	9
OVER 100	OVER 328	24

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	8
1.3 TO 1.4	23
1.4 TO 1.5	9
1.5 TO 1.6	34
1.6 TO 1.7	16
1.7 TO 1.8	23
1.8 TO 1.9	10
1.9 TO 2.0	9
2.0 TO 2.4	31
2.4 TO 2.6	5
2.6 TO 2.8	7
2.8 TO 3.0	2
3.0 TO 3.5	12
3.5 TO 4.0	3
4.0 TO 4.5	4
OVER 4.5	0



Area: HUM1 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 3.00 σ

Mean = 300.54 Kelvin

Std. Dev. = σ = 7.96 Kelvin

EQUIVALENT ELLIPTICAL AREAS

HUME1

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 300.54 Kelvin

σ = 7.96 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	1
10.0 TO	15.0	2
15.0 TO	20.0	2
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	1
35.0 TO	40.0	1
40.0 TO	45.0	1
45.0 TO	50.0	1
50.0 TO	75.0	1
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	0

TOTAL NUMBER OF ELLIPTICAL AREAS = 11

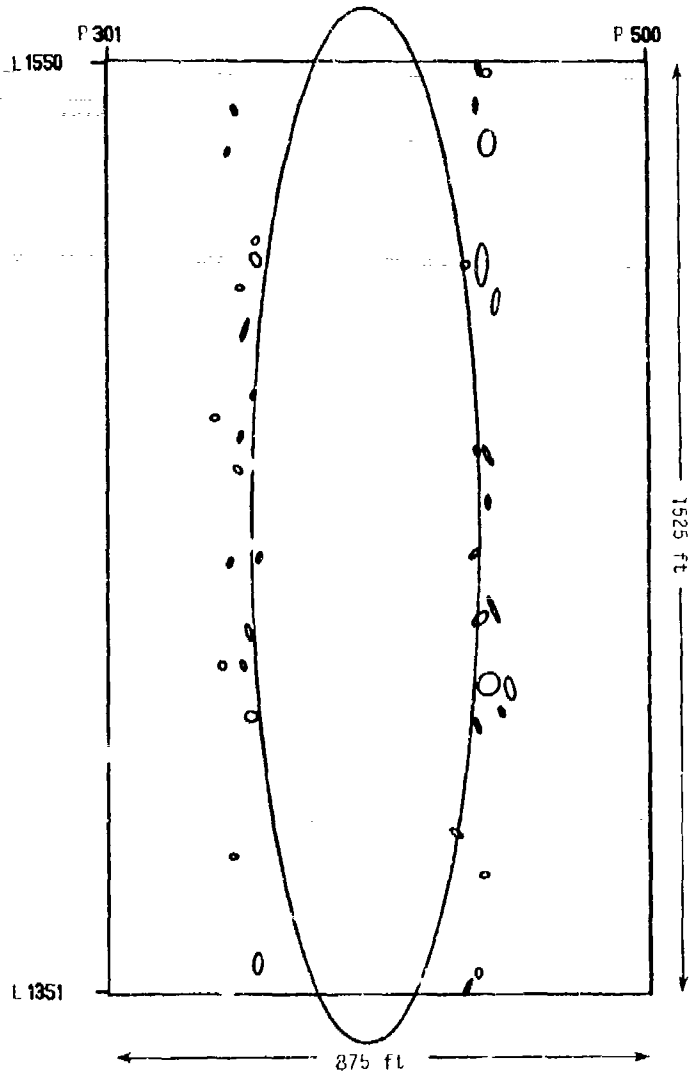
22 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	1
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	1
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	1
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	2
OVER 100	OVER 328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	2
1.5 TO 1.6	0
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	3
1.9 TO 2.0	0
2.0 TO 2.4	2
2.4 TO 2.6	0
2.6 TO 2.8	1
2.8 TO 3.0	1
3.0 TO 3.5	2
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: HUM2 (Wavelength = 2.0 - 2.6 μm)
Radiance Threshold = Mean + 2.00 σ
Mean = 150.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
Std. Dev. = σ = 112.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ

Wavelength = 2.0 - 2.6 μm

Mean = 150.25 μW-cm^{-2}-sr^{-1}-μm^{-1}

σ = 112.05 W-cm^{-2}-sr^{-1}-μm^{-1}

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	14
10.0 TO	15.0	10
15.0 TO	20.0	5
20.0 TO	25.0	2
25.0 TO	30.0	1
30.0 TO	35.0	3
35.0 TO	40.0	0
40.0 TO	45.0	1
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	3
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 40

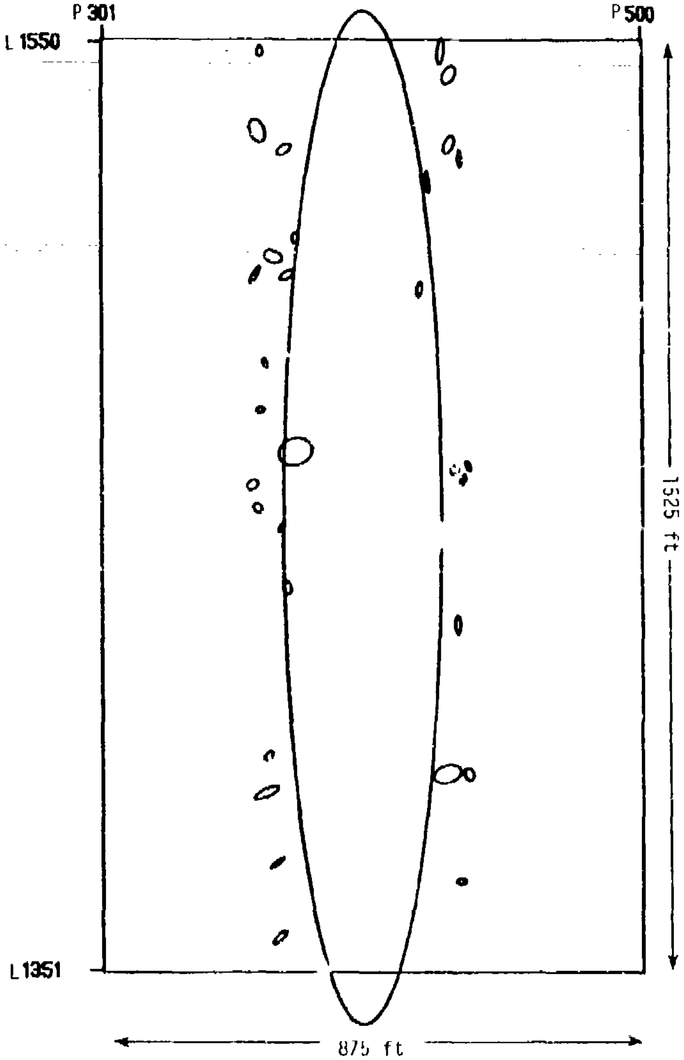
36 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	4
14 TO 16	45 TO 52	11
16 TO 17	52 TO 55	1
17 TO 20	55 TO 65	8
20 TO 22	65 TO 72	3
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	4
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	2
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	2
71 TO 100	232 TO 328	1
OVER 100	OVER 328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	7
1.2 TO 1.3	0
1.3 TO 1.4	15
1.4 TO 1.5	2
1.5 TO 1.6	4
1.6 TO 1.7	0
1.7 TO 1.8	5
1.8 TO 1.9	1
1.9 TO 2.0	2
2.0 TO 2.4	3
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	1



Area: HUM2 (Wavelength = 2.0 - 2.6 μm)

Radiance Threshold = Mean + 3.00 σ

Mean = 150.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

Std. Dev. = σ = 112.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 2.0 - 2.6 μm

Mean = 150.25 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

σ = 112.05 $\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1}$

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	[illegible]
10.0 TO	15.0	4
15.0 TO	20.0	8
20.0 TO	25.0	5
25.0 TO	30.0	0
30.0 TO	35.0	1
35.0 TO	40.0	1
40.0 TO	45.0	3
45.0 TO	50.0	0
50.0 TO	75.0	1
75.0 TO	100.0	1
100.0 TO	150.0	0
150.0 TO	200.0	1
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 32

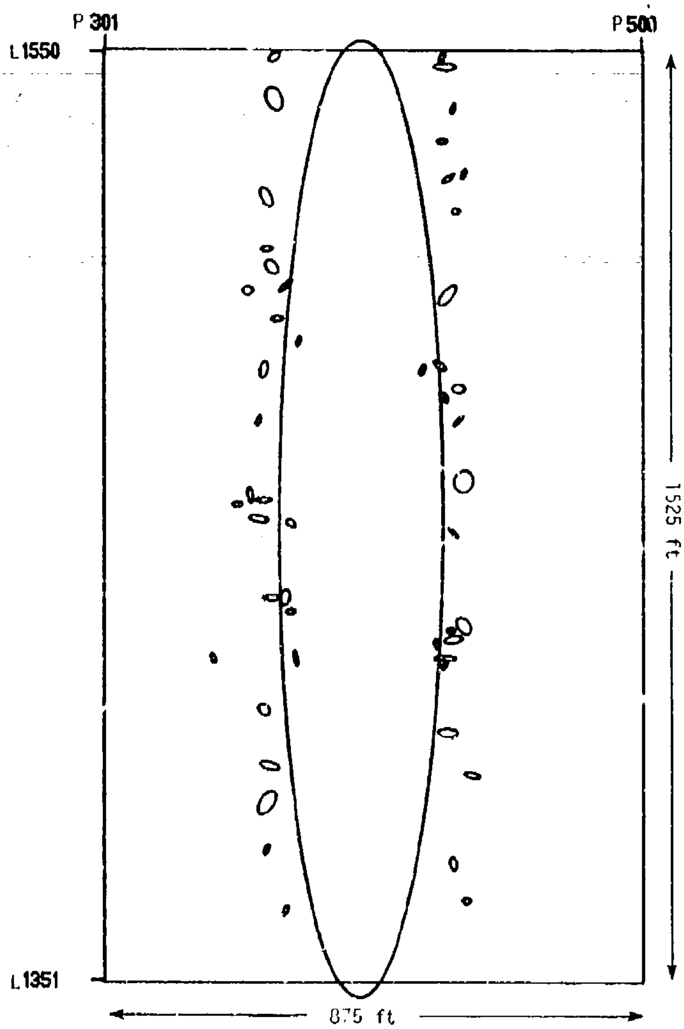
51 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	2
14 TO 16	45 TO 52	6
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	6
20 TO 22	65 TO 72	1
22 TO 24	72 TO 78	3
24 TO 26	78 TO 85	2
26 TO 28	85 TO 91	4
28 TO 30	91 TO 98	2
30 TO 32	98 TO 104	1
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	1
45 TO 55	147 TO 180	2
55 TO 71	180 TO 232	0
71 TO 100	23[illegible] TO 328	1
OVER 100	OVER 328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	4
1.2 TO 1.3	4
1.3 TO 1.4	9
1.4 TO 1.5	2
1.5 TO 1.6	4
1.6 TO 1.7	4
1.7 TO 1.8	1
1.8 TO 1.9	2
1.9 TO 2.0	1
2.0 TO 2.4	0
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	1



Area: HUM2 (Wavelength = 3.0 - 4.2 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 314.05 Kelvin
Std. Dev. = σ = 18.86 Kelvin
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 3.0 - 4.2 μm
Mean = 314.05 Kelvin
σ = 18.86 Kelvin

BY AREA

SQUARE METERS	FREQUENCY
8.0 TO 10.0	20
10.0 TO 15.0	5
15.0 TO 20.0	9
20.0 TO 25.0	5
25.0 TO 30.0	3
30.0 TO 35.0	3
35.0 TO 40.0	1
40.0 TO 45.0	1
45.0 TO 50.0	1
50.0 TO 75.0	2
75.0 TO 100.0	1
100.0 TO 150.0	0
150.0 TO 200.0	0
200.0 TO 250.0	0
250.0 TO 300.0	0
300.0 TO 400.0	0
400.0 TO 500.0	0
OVER 500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 52

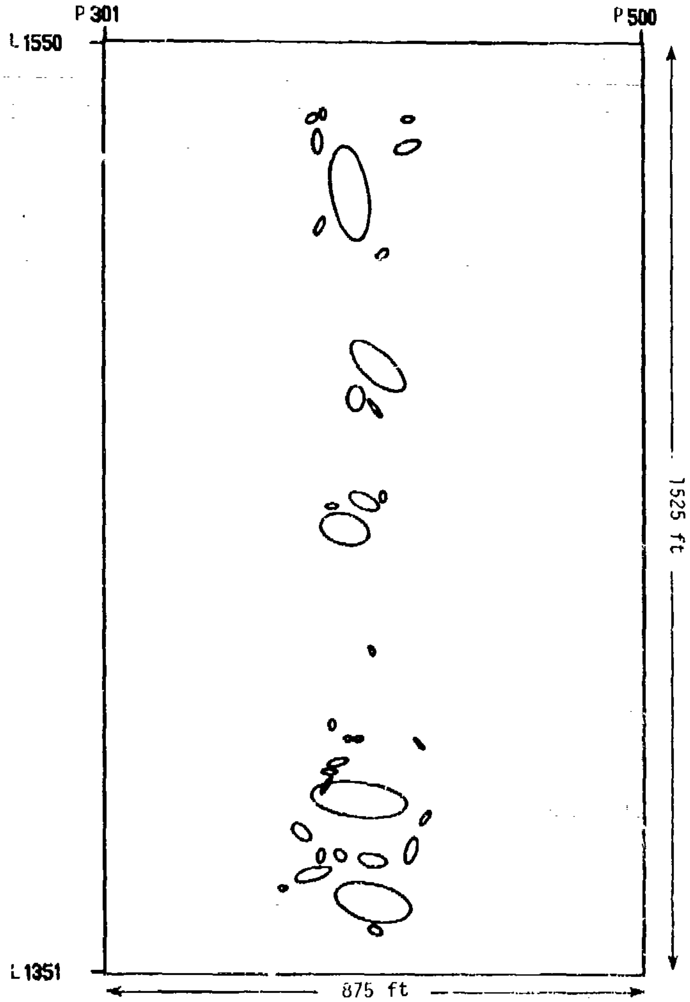
72 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	1
12 TO 14	39 TO 45	7
14 TO 16	45 TO 52	12
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	10
20 TO 22	65 TO 72	2
22 TO 24	72 TO 78	2
24 TO 26	78 TO 85	1
26 TO 28	85 TO 91	2
28 TO 30	91 TO 98	2
30 TO 32	98 TO 104	2
32 TO 39	104 TO 127	6
39 TO 45	127 TO 147	2
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	1
71 TO 100	232 TO 328	1
OVER 100	OVER 328	1

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	1
1.0 TO 1.1	1
1.1 TO 1.2	6
1.2 TO 1.3	3
1.3 TO 1.4	15
1.4 TO 1.5	8
1.5 TO 1.6	5
1.6 TO 1.7	3
1.7 TO 1.8	4
1.8 TO 1.9	1
1.9 TO 2.0	1
2.0 TO 2.4	2
2.4 TO 2.6	1
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	1



Area: HUM2 (Wavelength = 3.0 - 4.2 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 314.05 Kelvin
Std. Dev. = σ = 18.86 Kelvin
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ
Wavelength = 3.0 - 4.2 μm
Mean = 314.05 Kelvin
σ = 18.86 Kelvin

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	5
10.0	TO	15.0	5
15.0	TO	20.0	8
20.0	TO	25.0	2
25.0	TO	30.0	1
30.0	TO	35.0	0
35.0	TO	40.0	0
40.0	TO	45.0	1
45.0	TO	50.0	0
50.0	TO	75.0	4
75.0	TO	100.0	3
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	1
300.0	TO	400.0	1
400.0	TO	500.0	0
	OVER	500.0	3

TOTAL NUMBER OF ELLIPTICAL AREAS = 34

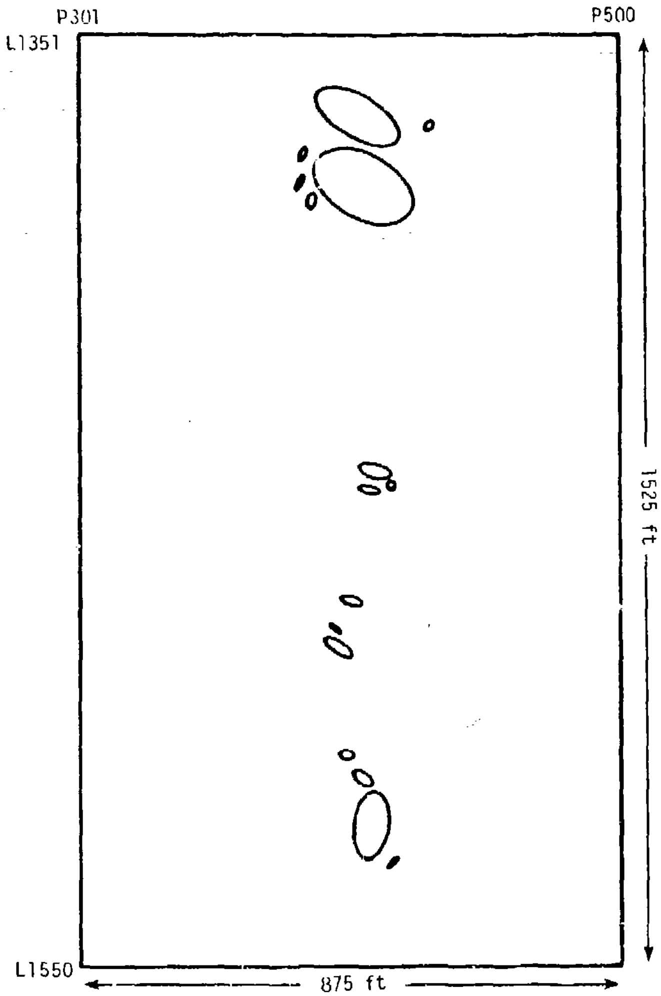
31 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	3
14	TO	16	45	TO	52	6
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	5
20	TO	22	65	TO	72	0
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	2
26	TO	28	85	TO	91	0
28	TO	30	91	TO	98	2
30	TO	32	98	TO	104	1
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	1
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	1
71	TO	100	232	TO	328	5
OVER		100	OVER		328	5

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	6
1.2	TO	1.3	3
1.3	TO	1.4	4
1.4	TO	1.5	0
1.5	TO	1.6	2
1.6	TO	1.7	2
1.7	TO	1.8	1
1.8	TO	1.9	2
1.9	TO	2.0	1
2.0	TO	2.4	3
2.4	TO	2.6	3
2.6	TO	2.8	2
2.8	TO	3.0	0
3.0	TO	3.5	2
3.5	TO	4.0	1
4.0	TO	4.5	1
OVER		4.5	1



Area: HUM2 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 2.50 σ
Mean = 290.83 Kelvin
Std. Dev. = σ = 2.72 Kelvin
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

BY AREA

SQUARE METERS			FREQUENCY
8.0	TO	10.0	2
10.0	TO	15.0	1
15.0	TO	20.0	3
20.0	TO	25.0	2
25.0	TO	30.0	0
30.0	TO	35.0	1
35.0	TO	40.0	1
40.0	TO	45.0	0
45.0	TO	50.0	1
50.0	TO	75.0	1
75.0	TO	100.0	1
100.0	TO	150.0	0
150.0	TO	200.0	0
200.0	TO	250.0	0
250.0	TO	300.0	0
300.0	TO	400.0	0
400.0	TO	500.0	1
	OVER	500.0	2

Threshold = Mean + 2.50 σ

Wavelength = 4.5 - 5.5 μm

Mean = 290.83 Kelvin

σ = 2.72 Kelvin

TOTAL NUMBER OF ELLIPTICAL AREAS = 16

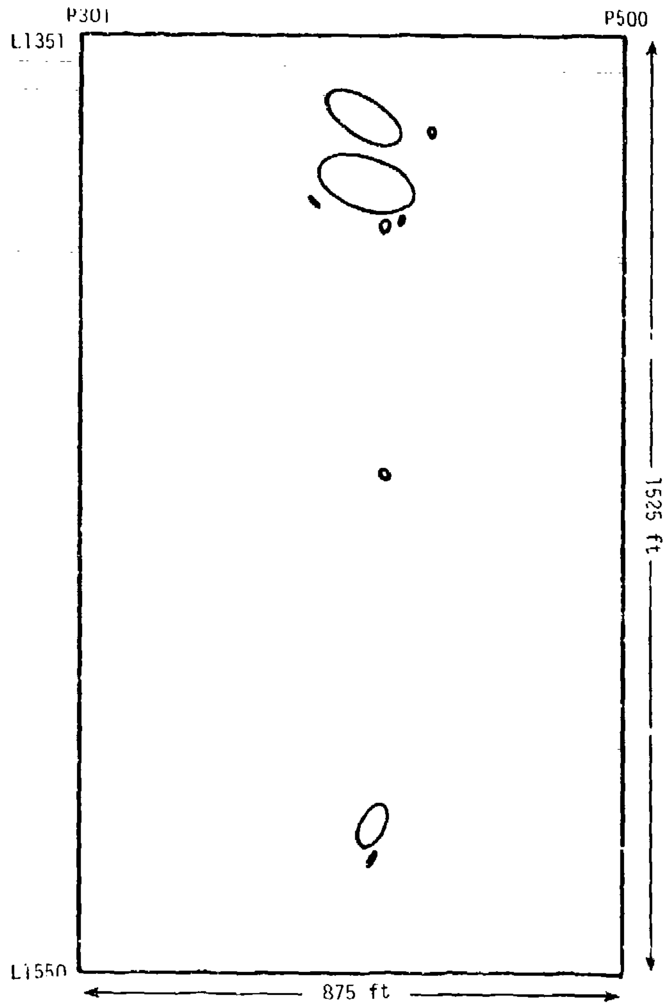
15 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS			FEET			FREQUENCY
0	TO	7	0	TO	22	0
7	TO	10	22	TO	32	0
10	TO	12	32	TO	39	0
12	TO	14	39	TO	45	0
14	TO	1[illegible]	45	TO	52	0
16	TO	17	52	TO	55	0
17	TO	20	55	TO	65	4
20	TO	22	65	TO	72	2
22	TO	24	72	TO	78	0
24	TO	26	78	TO	85	0
26	TO	28	85	TO	91	1
28	TO	30	91	TO	98	1
30	TO	32	98	TO	104	1
32	TO	39	104	TO	127	1
39	TO	45	127	TO	147	0
45	TO	55	147	TO	180	2
55	TO	71	180	TO	232	0
71	TO	100	232	TO	328	1
OVER		100	OVER		328	3

BY SHAPE

SHAPE FACTOR			FREQUENCY
0.0	TO	1.0	0
1.0	TO	1.1	0
1.1	TO	1.2	0
1.2	TO	1.3	1
1.3	TO	1.4	1
1.4	TO	1.5	1
1.5	TO	1.6	6
1.6	TO	1.7	0
1.7	TO	1.8	0
1.8	TO	1.9	4
1.9	TO	2.0	0
2.0	TO	2.4	0
2.4	TO	2.6	1
2.6	TO	2.8	0
2.8	TO	3.0	0
3.0	TO	3.5	2
3.5	TO	4.0	0
4.0	TO	4.5	0
	OVER	4.5	0



Area: HUM2 (Wavelength = 4.5 - 5.5 μm)
Temperature Threshold = Mean + 3.00 σ
Mean = 290.83 Kelvin
Std. Dev. = σ = 2.72 Kelvin
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

ERIM

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 3.00 σ

Wavelength = 4.5 - 5.5 μm

Mean = 290.83 Kelvin

σ = 2.72 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	2
10.0 TO	15.0	2
15.0 TO	20.0	1
20.0 TO	25.0	1
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	1
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 9

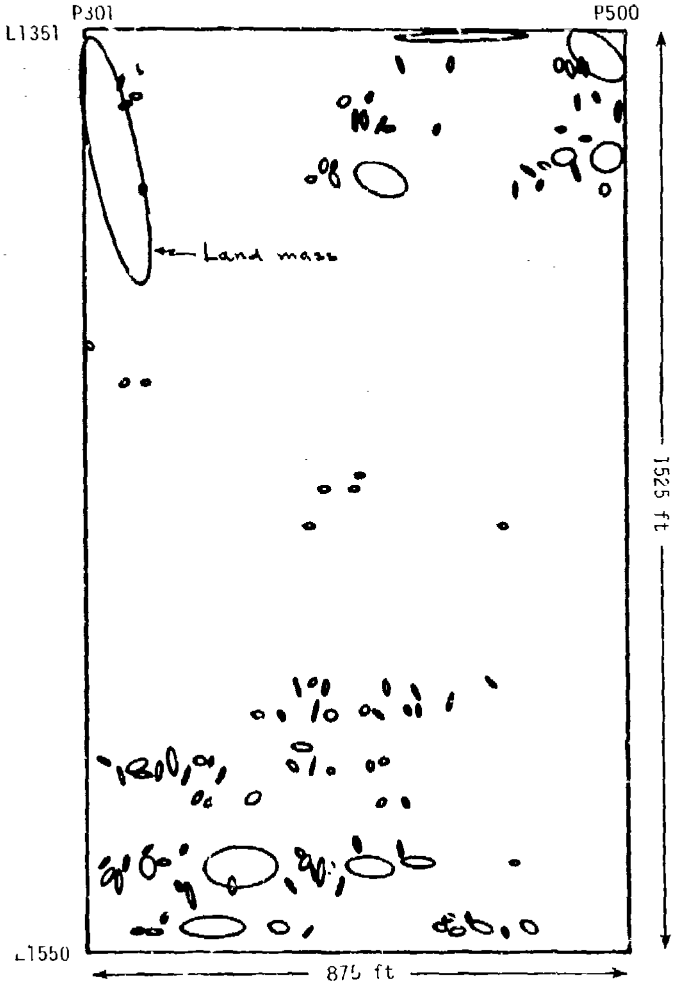
17 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS		FEET		FREQUENCY
0 TO	7	0 TO	22	0
7 TO	10	22 TO	32	0
10 TO	12	32 TO	39	0
12 TO	14	39 TO	45	0
14 TO	16	45 TO	52	2
16 TO	17	52 TO	55	0
17 TO	20	55 TO	65	2
20 TO	22	65 TO	72	1
22 TO	24	72 TO	78	0
24 TO	26	78 TO	85	1
26 TO	28	85 TO	91	0
28 TO	30	91 TO	98	0
30 TO	32	98 TO	104	0
32 TO	39	104 TO	127	0
39 TO	45	127 TO	147	0
45 TO	55	147 TO	180	0
55 TO	71	180 TO	232	0
71 TO	100	232 TO	328	0
OVER	100	OVER	328	3

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	1
1.2 TO 1.3	1
1.3 TO 1.4	1
1.4 TO 1.5	1
1.5 TO 1.6	1
1.6 TO 1.7	0
1.7 TO 1.8	1
1.8 TO 1.9	0
1.9 TO 2.0	1
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	1
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0



Area: HUM2 (Wavelength = 9.0 - 11.4 μm)

Temperature Threshold = Mean + 1.00 σ

Mean = 288.46 Kelvin

Std. Dev. = σ = 0.65 Kelvin

EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 1.00 σ

Wavelength = 9.0 - 11.4 μm

Mean = 288.46 Kelvin

σ = 0.65 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
8.0 TO	10.0	39
10.0 TO	15.0	28
15.0 TO	20.0	20
20.0 TO	25.0	9
25.0 TO	30.0	5
30.0 TO	35.0	4
35.0 TO	40.0	0
40.0 TO	45.0	3
45.0 TO	50.0	1
50.0 TO	75.0	3
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	2
200.0 TO	250.0	1
250.0 TO	300.0	1
300.0 TO	400.0	1
400.0 TO	500.0	1
OVER	500.0	2

TOTAL NUMBER OF ELLIPTICAL AREAS = 120

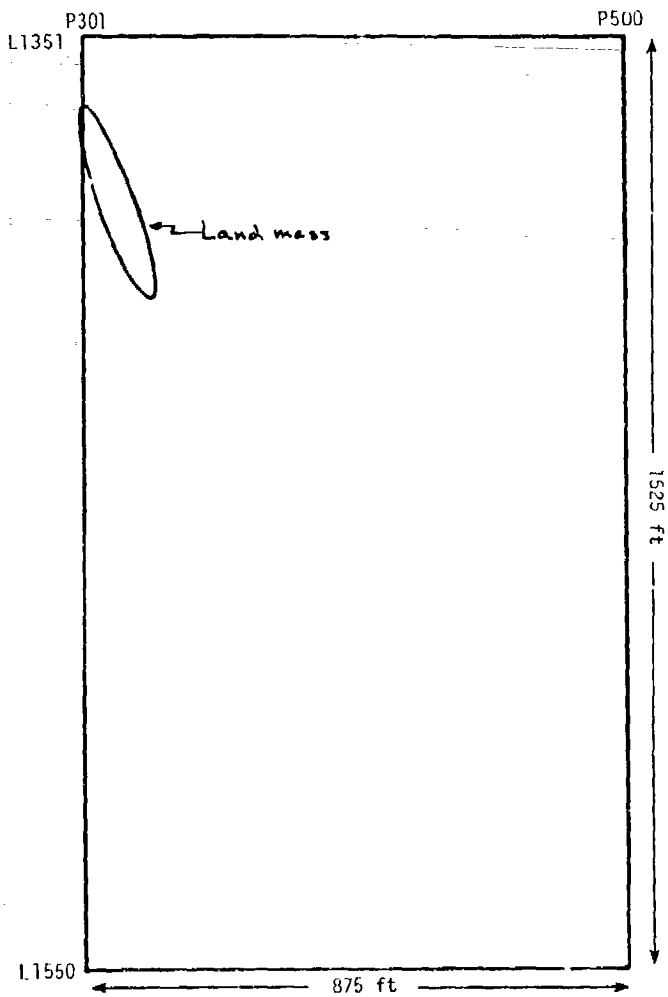
410 FEATURES WITH AREAS LESS THAN 8.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	6
14 TO 16	45 TO 52	25
16 TO 17	52 TO 55	2
17 TO 20	55 TO 65	31
20 TO 22	65 TO 72	10
22 TO 24	72 TO 78	1
24 TO 26	78 TO 85	7
26 TO 28	85 TO 91	5
28 TO 30	91 TO 98	4
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	8
39 TO 45	127 TO 147	4
45 TO 55	147 TO 180	3
55 TO 71	180 TO 232	4
71 TO 100	232 TO 328	2
OVER 100	OVER 328	8

BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	8
1.2 TO 1.3	7
1.3 TO 1.4	29
1.4 TO 1.5	2
1.5 TO 1.6	15
1.6 TO 1.7	4
1.7 TO 1.8	20
1.8 TO 1.9	1
1.9 TO 2.0	6
2.0 TO 2.4	13
2.4 TO 2.6	3
2.6 TO 2.8	2
2.8 TO 3.0	0
3.0 TO 3.5	4
3.5 TO 4.0	1
4.0 TO 4.5	1
OVER 4.5	4



Area: HUM2 (Wavelength = 9.0 - 11.4 μm)
Temperature Threshold = Mean + 2.00 σ
Mean = 288.46 Kelvin
Std. Dev. = σ = 0.65 Kelvin
EQUIVALENT ELLIPTICAL AREAS - WATER GLINTS

HUME2 (Water Glints)

DISTRIBUTION OF ELLIPTICAL AREAS GREATER THAN THRESHOLD

Threshold = Mean + 2.00 σ
Wavelength = 9.0 - 11.4 μm
Mean = 288.46 Kelvin
σ = 0.65 Kelvin

BY AREA

SQUARE METERS		FREQUENCY
5.0 TO	10.0	0
10.0 TO	15.0	0
15.0 TO	20.0	0
20.0 TO	25.0	0
25.0 TO	30.0	0
30.0 TO	35.0	0
35.0 TO	40.0	0
40.0 TO	45.0	0
45.0 TO	50.0	0
50.0 TO	75.0	0
75.0 TO	100.0	0
100.0 TO	150.0	0
150.0 TO	200.0	0
200.0 TO	250.0	0
250.0 TO	300.0	0
300.0 TO	400.0	0
400.0 TO	500.0	0
OVER	500.0	1

TOTAL NUMBER OF ELLIPTICAL AREAS = 1

1 FEATURES WITH AREAS LESS THAN 0.00 SQ. METERS WERE ALSO RECOGNIZED

BY PERIMETER

METERS	FEET	FREQUENCY
0 TO 7	0 TO 22	0
7 TO 10	22 TO 32	0
10 TO 12	32 TO 39	0
12 TO 14	39 TO 45	0
14 TO 16	45 TO 52	0
16 TO 17	52 TO 55	0
17 TO 20	55 TO 65	0
20 TO 22	65 TO 72	0
22 TO 24	72 TO 78	0
24 TO 26	78 TO 85	0
26 TO 28	85 TO 91	0
28 TO 30	91 TO 98	0
30 TO 32	98 TO 104	0
32 TO 39	104 TO 127	0
39 TO 45	127 TO 147	0
45 TO 55	147 TO 180	0
55 TO 71	180 TO 232	0
71 TO 100	232 TO 328	0
OVER 100	OVER 328	1

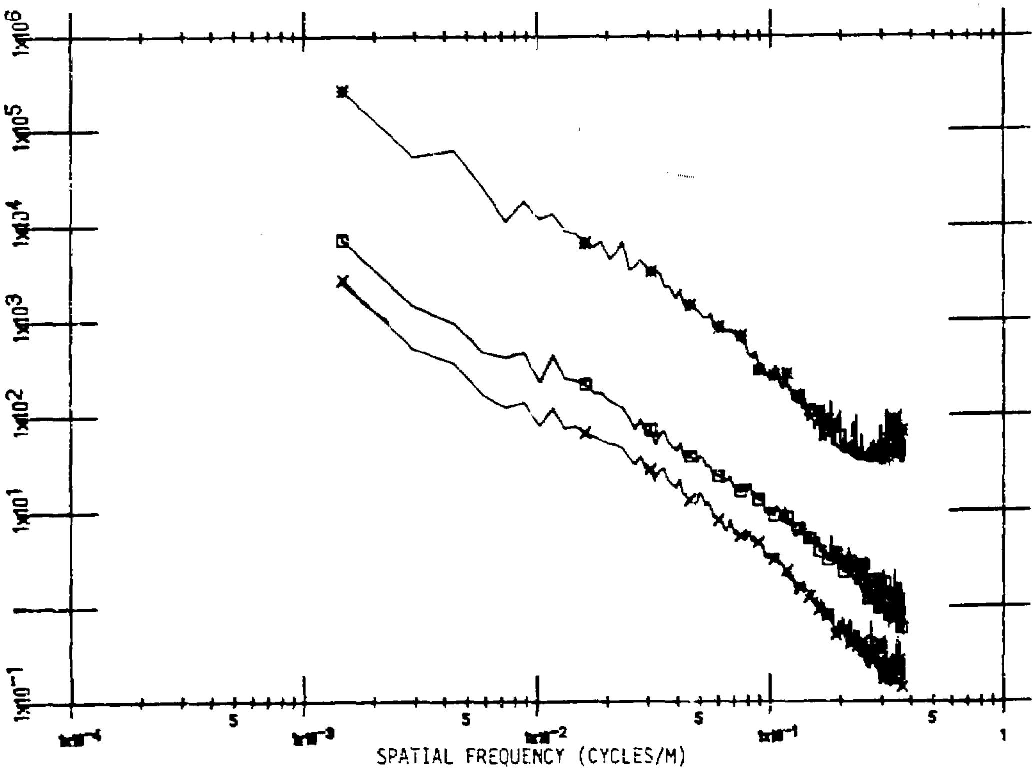
BY SHAPE

SHAPE FACTOR	FREQUENCY
0.0 TO 1.0	0
1.0 TO 1.1	0
1.1 TO 1.2	0
1.2 TO 1.3	0
1.3 TO 1.4	0
1.4 TO 1.5	0
1.5 TO 1.6	0
1.6 TO 1.7	0
1.7 TO 1.8	0
1.8 TO 1.9	0
1.9 TO 2.0	0
2.0 TO 2.4	1
2.4 TO 2.6	0
2.6 TO 2.8	0
2.8 TO 3.0	0
3.0 TO 3.5	0
3.5 TO 4.0	0
4.0 TO 4.5	0
OVER 4.5	0

PORT HUENEME, CALIFORNIA

Power Spectra

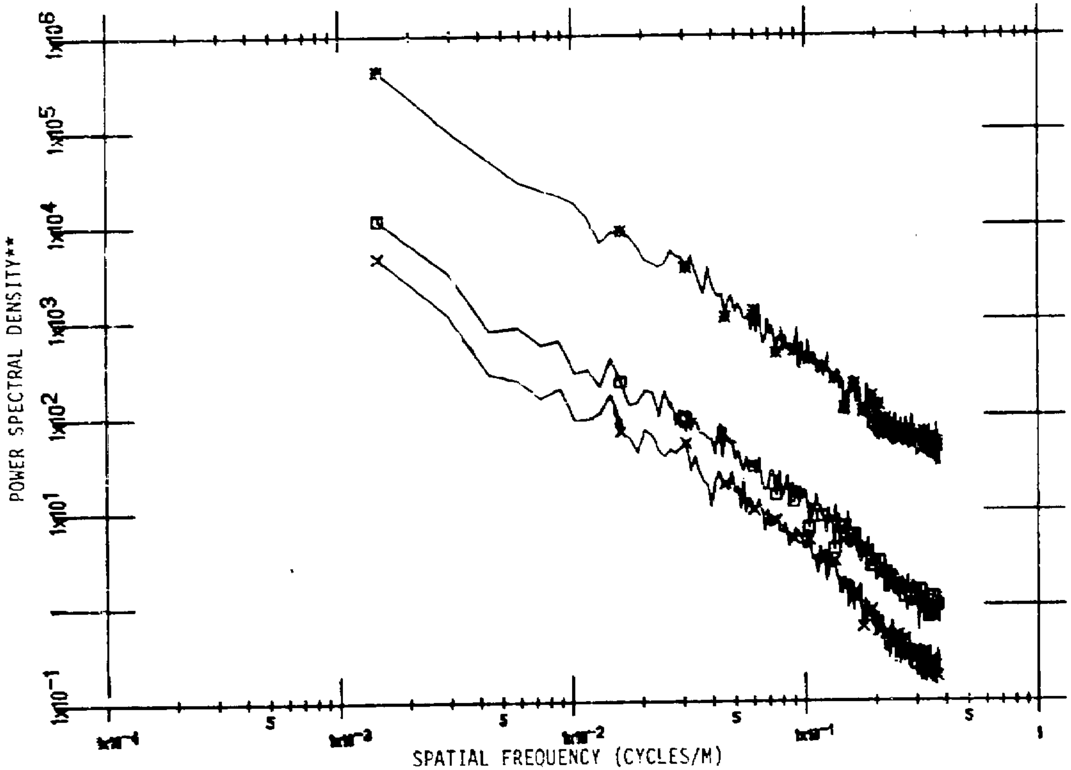
Spectral Bands: 2.0 - 2.6 µm
3.0 - 4.2 µm
4.5 - 5.5 µm
9.0 - 11.4 µm



Area: HCM1 CROSS-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA

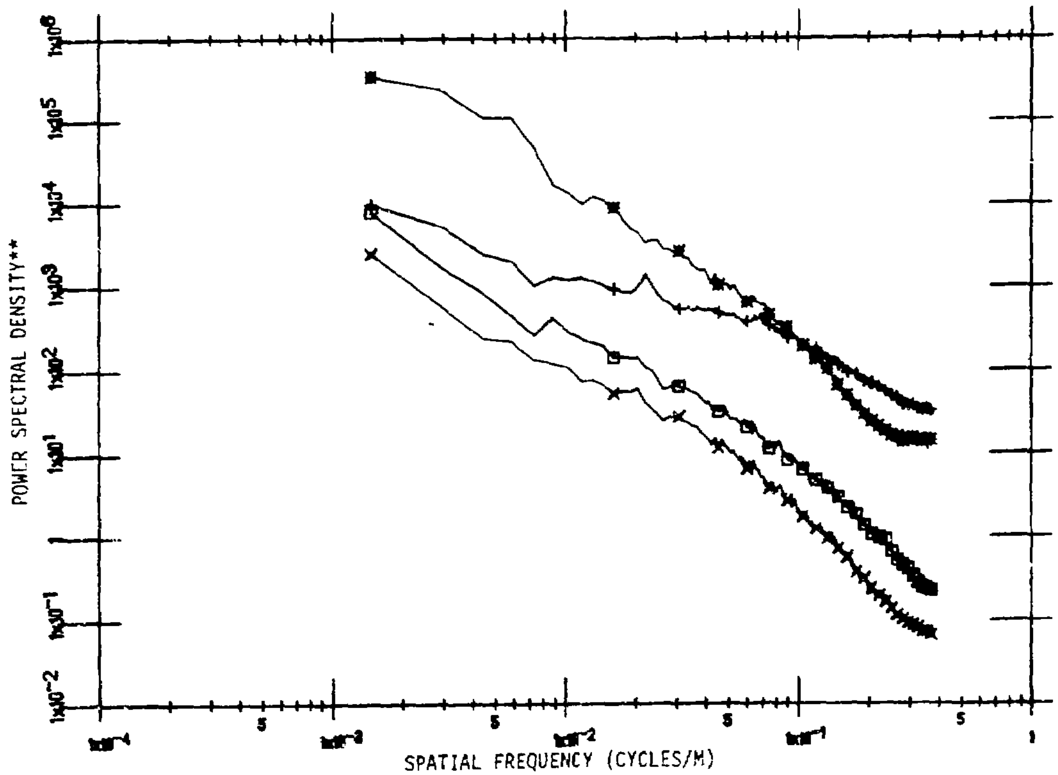
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 to 11.4 μm bands.



Area: HUM1 IN-TRACK Wavelength = 2.0-2.6 (*), 4.5-5.5 (X), 9.0-11.4 (⊡)

POWER SPECTRA

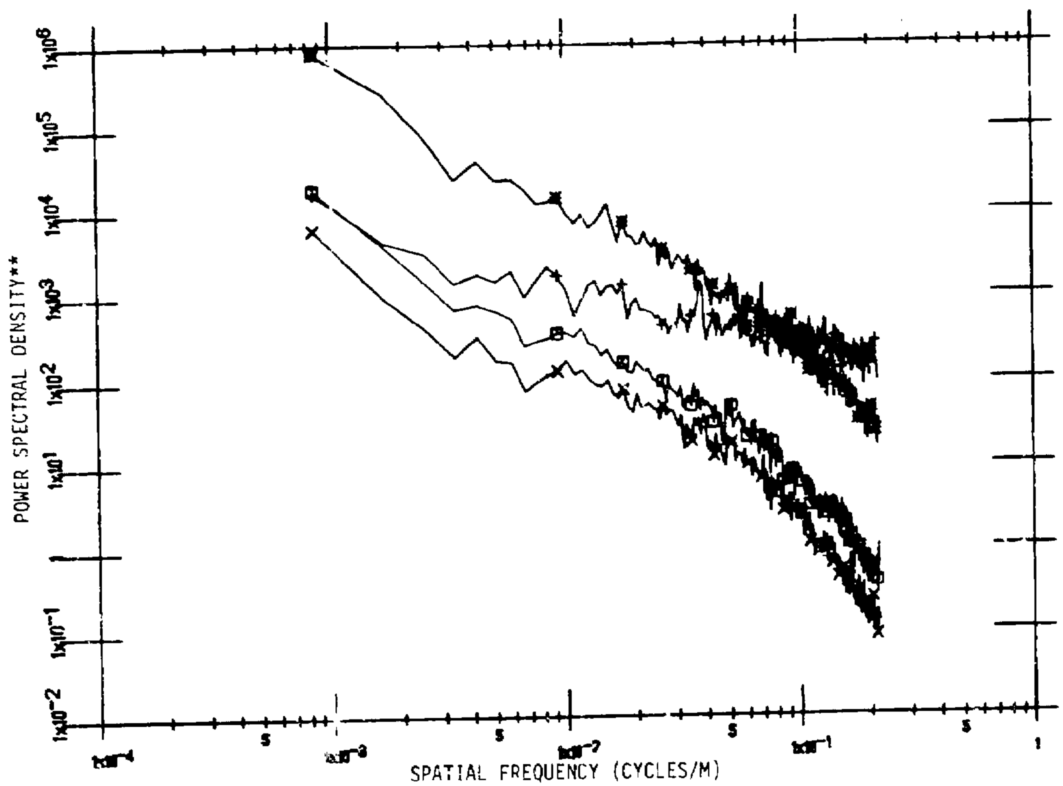
**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^\circ K)^2$/cycle/meter for the 4.5 to 5.5 and 9.0 - 11.4 μm bands.



Area: HUM2 CROSS-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡)
(Glints)

POWER SPECTRA

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(°K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.



Area: HUM2 IN-TRACK Wavelength = 2.0-2.6 (*), 3.0-4.2 (+), 4.5-5.5 (X), 9.0-11.4 (⊡) (Glints)

POWER SPECTRA

**Power spectral density is $(\mu W\text{-}cm^{-2}\text{-}sr^{-1}\text{-}\mu m^{-1})^2$/cycle/meter for the 2.0 to 2.6 μm band, and $(^\circ K)^2$/cycle/meter for the 3.0 to 4.2, 4.5 to 5.5, and 9.0 to 11.4 μm bands.

APPENDIX A
THE MULTISPECTRAL SCANNER*

Two multispectral scanner systems have been in use at ERIM since 1968. The M-7 scanner was used at the time the Flint, Baltimore, and Mill Creek data were generated while its predecessor the M-5 scanner was used in gathering the Pisgah Crater, Black Hills, and Mono Lake data. All data subsequent to these were collected with the M-7. The two scanners are similar so that only the M-7 is discussed in detail.

The M-7 scanner, covering a wavelength range from 0.33 to 14.0 micrometers, can operate in up to 19 different bands of the ultraviolet, visible, and infrared regions. Of these bands, 12 can be selected for tape recording at any one time. As many as five separate radiation reference sources may be recorded sequentially along with the ground video once each scan line. The total system, including boresight cameras, is usually operated in a Douglas C-47 aircraft.

The simplified diagrams of Figure A.1 illustrate a typical line scanner and its methods of airborne use. As shown in the optical schematic at the top of the figure, the scanner basically consists of an optical telescope with its narrow field of view redirected by a rotating flat mirror. This mirror causes the system to scan in a plane perpendicular to the longitudinal axis of the aircraft. A radiation detector in the focal plane of the telescope converts the focused beam of radiation to an electrical signal. The optical system's field of view (ground resolution element) first scans laterally across the aircraft ground track through an opening in the bottom of the aircraft. Then before making the next ground scan, it scans radiation references

*The ERIM Airborne Multispectral Data Collection is described in the ERIM 190901-1-F report prepared by Philip G. Hasell, Jr. under Contract NAS9-9304. The multispectral scanner is described here in order to familiarize the reader with the multispectral scanner system used to collect the data.

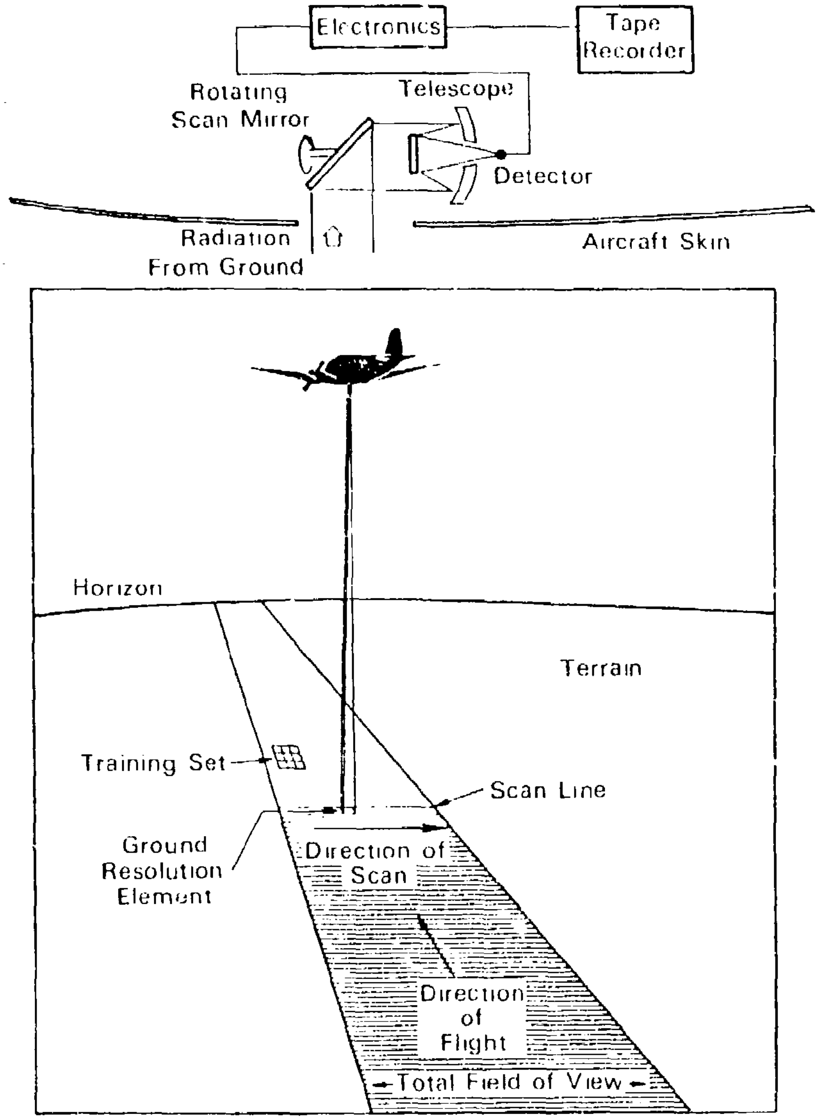


FIGURE A.1 AIRBORNE MULTISPECTRAL SCANNER OPERATION

(not shown) which are internal to the scanner. By the time the next scan begins, the aircraft has moved forward; thus subsequent line scans build upon one another to produce a continuous strip image of the terrain beneath the aircraft. Figure A.1 shows the scanner looking directly downward. It is positioned in some flights to obtain similar data while looking below the horizon by 35 degrees.

The multispectral scanner evolved from this single-channel scanner concept. This evolution required replacement of the single detector element with a system of beamsplitters, dispersing optics, and spectral filters. Figure A.2 shows the optical configuration of the current M-7 multispectral scanner. A key feature in this design is its flexibility for accepting different radiation reference sources and new detector assemblies. Weight and space savings were sacrificed to provide this flexibility, which allows increased opportunities for adaptation to a diverse number of data gathering modes. Such flexibility is an important attribute for a general-purpose experiment system.

The radiation intercepted by the five-inch diameter-collecting aperture is directed into the Dall-Kirkham telescope, which has a three-inch diameter secondary mirror. The incoming radiation prevented from entering the telescope by this secondary mirror is directed upward by a folding mirror to Detector Position 1. This three-inch diameter collecting aperture operates over the broad band of 0.3 to 14.0 μm. To provide thermal data at this position, a focusing lens designed for the 8.0-14.0 μm band is used in combination with a cooled HgCdTe detector. A dichroic mirror mounted ahead of this lens diverts ultraviolet and visible radiation onto a photomultiplier detector which is filtered so the energy it receives for recording is restricted to a narrow preselected band.

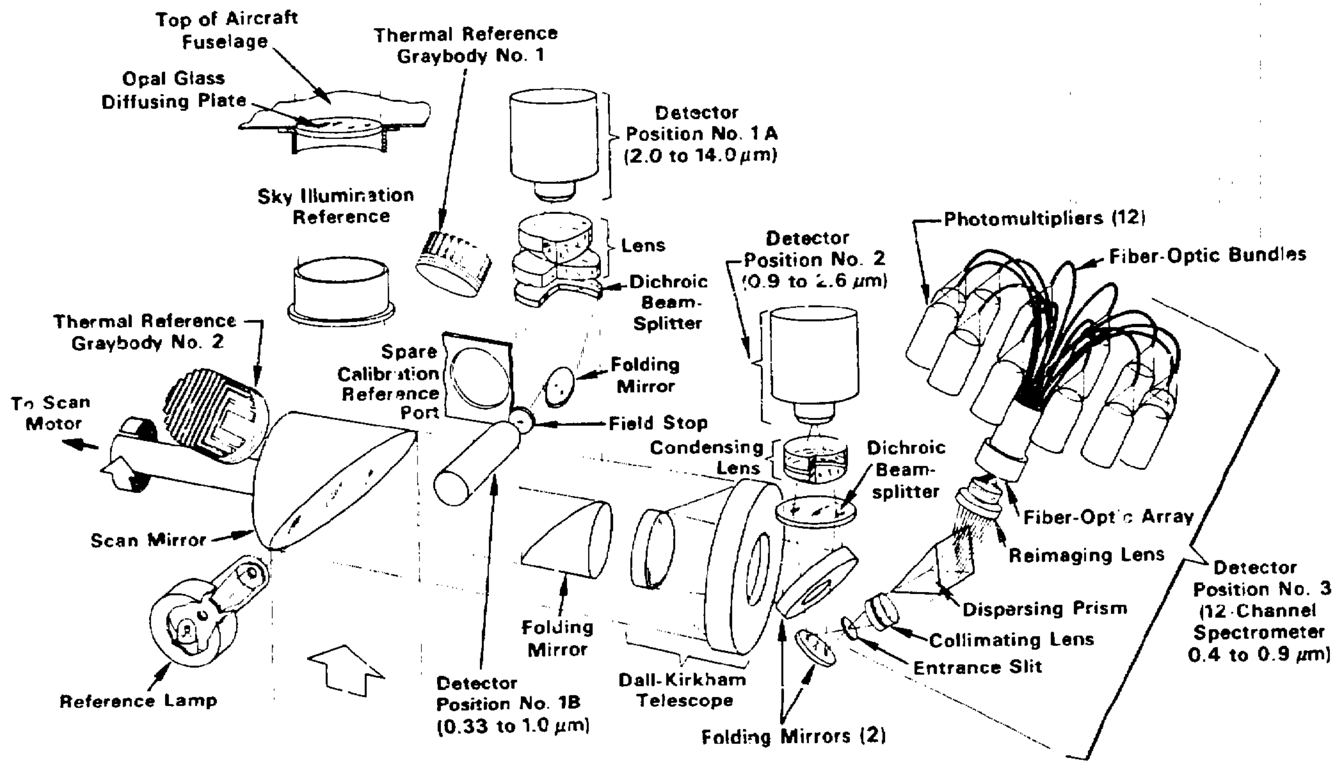


FIGURE A.2 OPTICAL SCHEMATIC OF ERIM EXPERIMENTAL MULTISPECTRAL SCANNER, M-7

The radiation collected by the effective four-inch aperture of the Dall-Kirkham telescope is folded into a dichoric mirror which reflects radiation below 1.0 μm but transmits that of longer wavelengths. The radiation thus transmitted is focused onto three separately filtered indium arsenide detector elements in Position 2 by a lens achromatized for the 1.0 to 2.6 μm region. This dichroic and lens can be readily changed for different detector configurations.

Radiation at wavelengths shorter than 1.0 μm is focused onto the entrance slit of a prism spectrometer at Detector Position 3. The spectrometer divides and directs visible and near-infared radiation through a fiber-optic image slicer to as many as 12 photomultiplier tubes. (In the current configuration the radiation goes to nine separate photomultipliers.)

The radiation reference sources are positioned in line with the scan mirror, so that each source is "seen" and registered sequentially once each scan line. Currently, five reference sources are being used: an NBS lamp packaged to simulate a point source; one ambient and two temperature-controlled graybody thermal references that fill the collecting aperture; and a sky illumination reference consisting of an opal glass diffusing plate mounted in the top of the aircraft. Through electronic control of the lamp and graybodies and by means of attenuating optical filters for the sky illumination, the radiation from all but the ambient temperature reference sources is under operator control. During data collection, all internal sources are monitored and recorded manually by the operator. To assure their validity as references, these sources are calibrated periodically against external standards in the laboratory.

The complete airborne scanner system is diagrammed in Figure A.6. Terrain radiation enters the scanner at the bottom left; radiation detectors in the scanner assembly register this input along with that

of the reference sources. The electrical signals comprising detector video outputs are amplified in preamplifiers before being transmitted to the operator console where the operator monitors them and adjusts amplifier gain to the proper level for tape recording. To confirm satisfactory recording, he is also able to monitor signals reproduced from the tape record. The system linearly transforms input radiation to voltage analogs which are recorded on the magnetic tape. The scanner system can generate video signals in up to 19 different spectral bands over a wavelength range extending from 0.33 to 14.0 μm. Any 12 of these bands may be digitally tape recorded at any one time on a 14-track tape machine; the other two tape recorder tracks are used for housekeeping purposes.

Figures A.3 through A.5 show the actual relative spectral response of the detector/filter combinations, as measured by the supplier, that have been used in collecting the data described in this handbook.

The airborne system (Figure A.6) also includes an array of boresight cameras utilizing various film-filter combinations. These aerial cameras produce film records often useful in the subsequent analysis of the scanner data.

Electrical voltage representations of single line scans for the thermal and non-thermal wavelength bands are shown in Figure A.7. Note that although the detectors in all positions view, in sequence, each of the radiation references as well as the terrain (see "ground scan"), only the graybody references apply to every wavelength band. These graybody references (#1 and #2 and thermal ambient) serve as temperature calibration sources for the thermal detectors and also as a dark level source for the shorter-wavelength non-thermal detectors. The remaining sources (lamp and sky) serve as references for

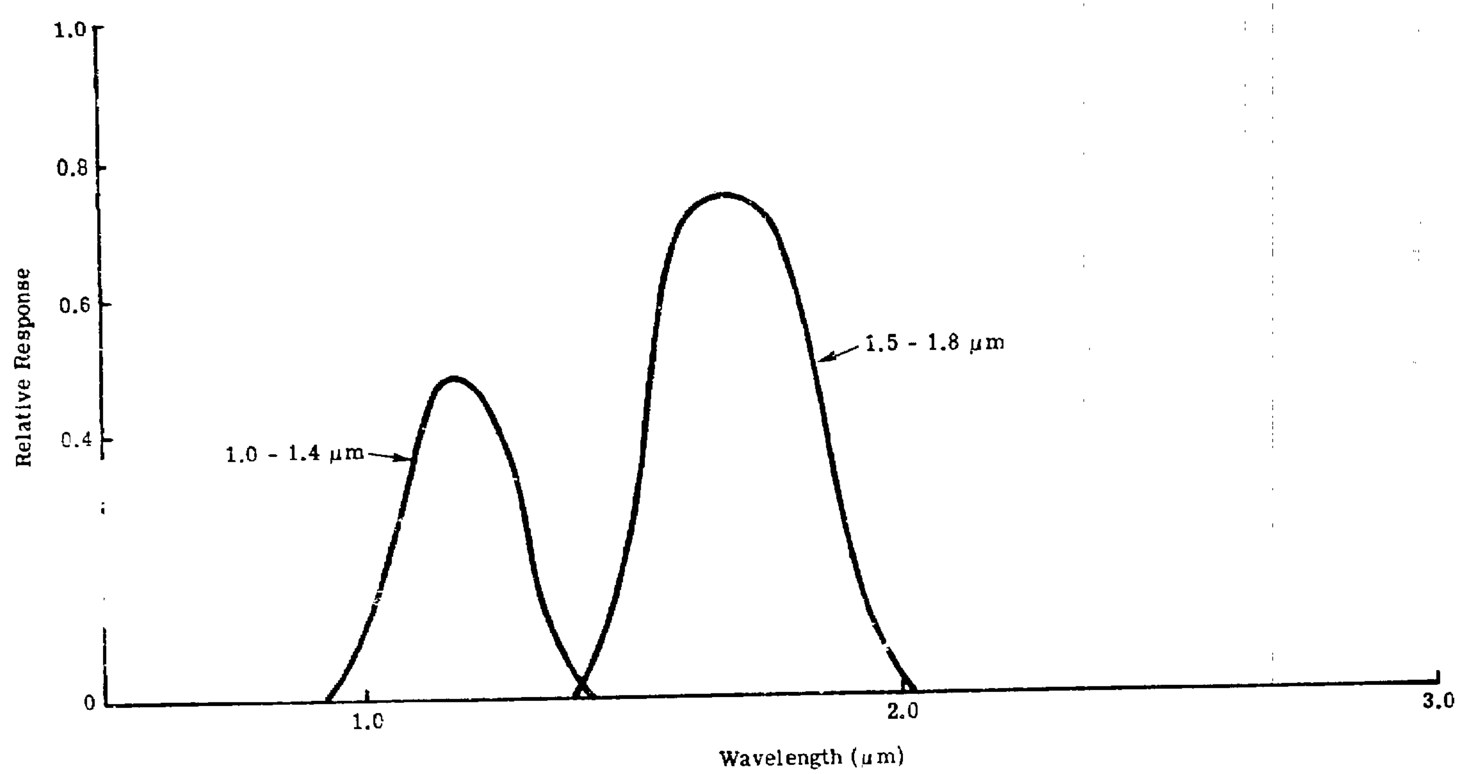


FIGURE A.3 SPECTRAL RESPONSE OF THE InAs DETECTOR

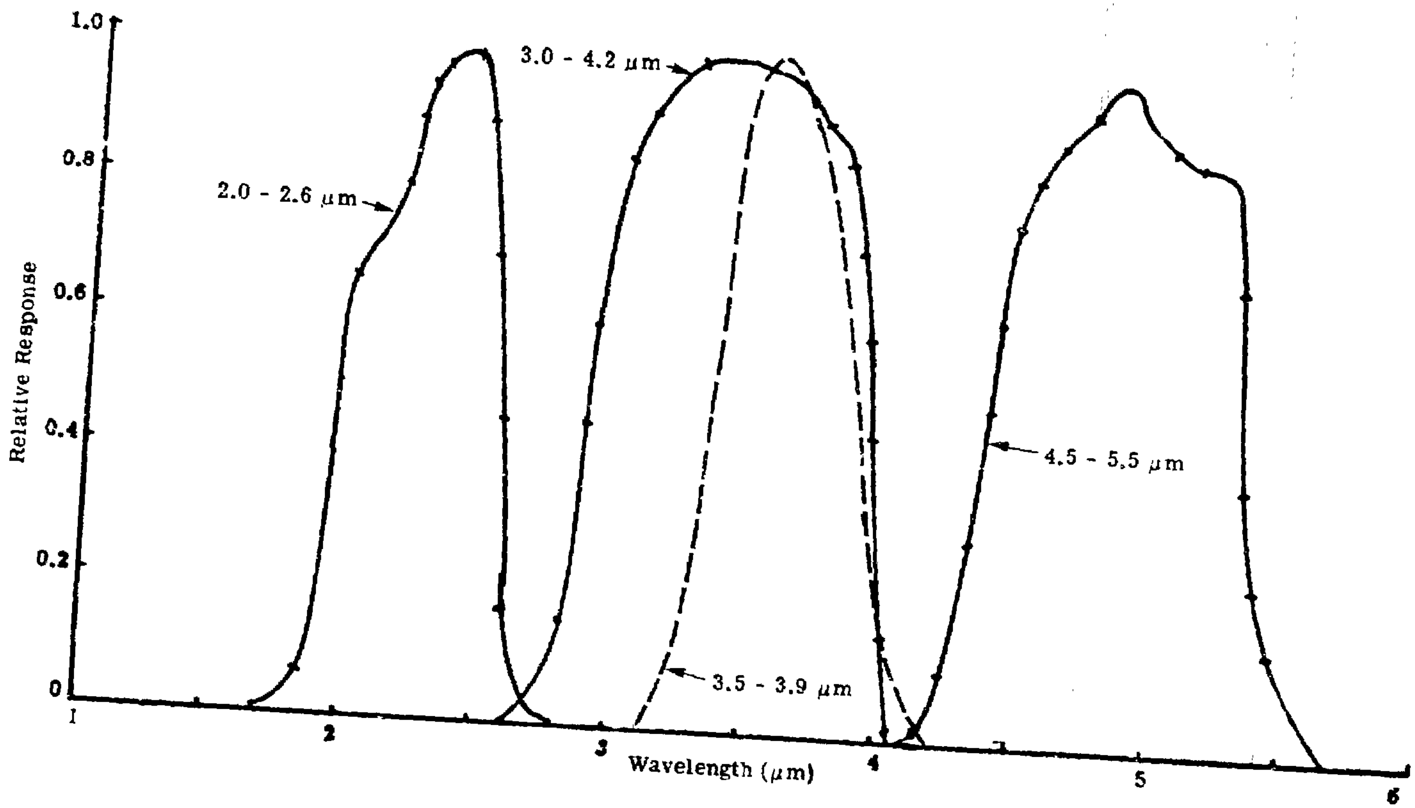


FIGURE A.4 SPECTRAL RESPONSE OF MID-IR InSb DETECTOR ARRAY

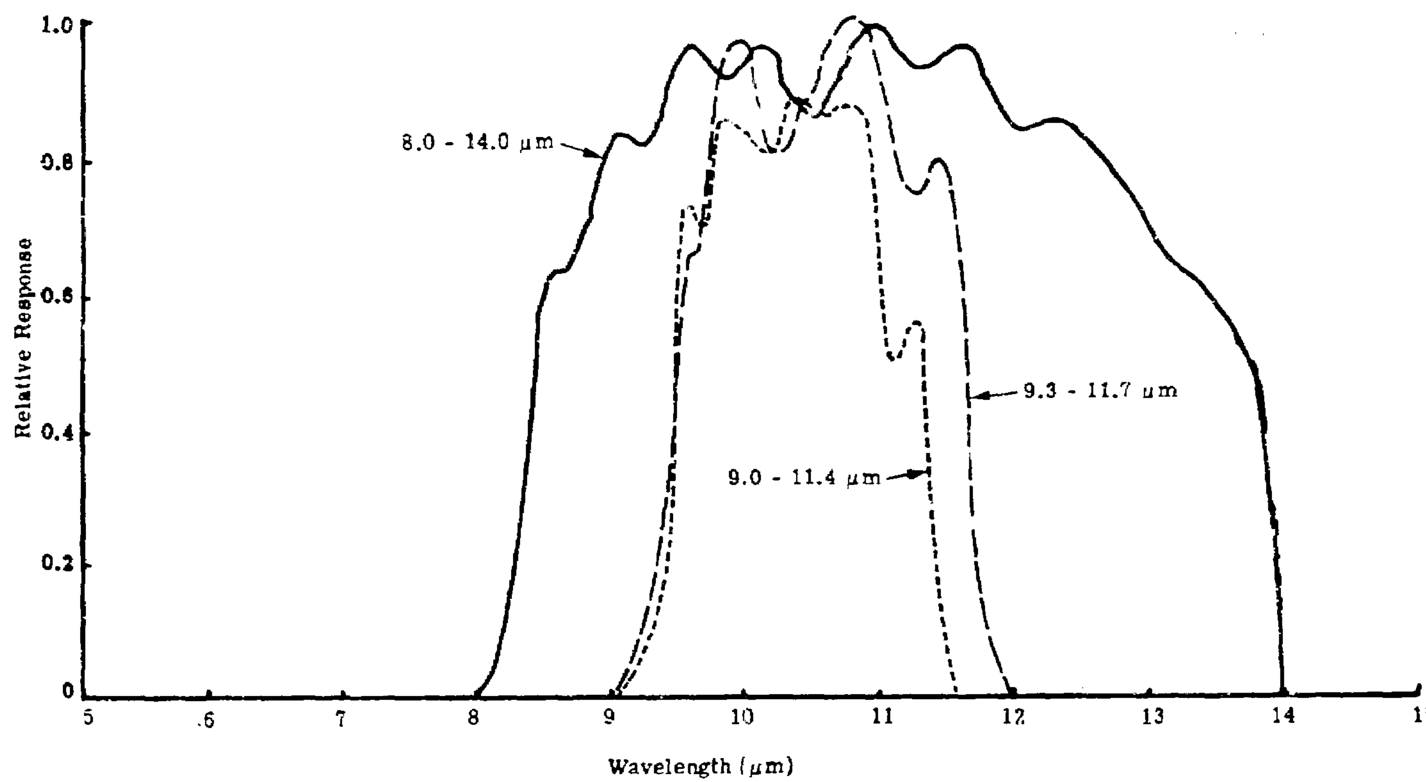


FIGURE A.5 SPECTRAL RESPONSE OF LONG WAVE IR DETECTOR/FILTER COMBINATION (HgCdTe)

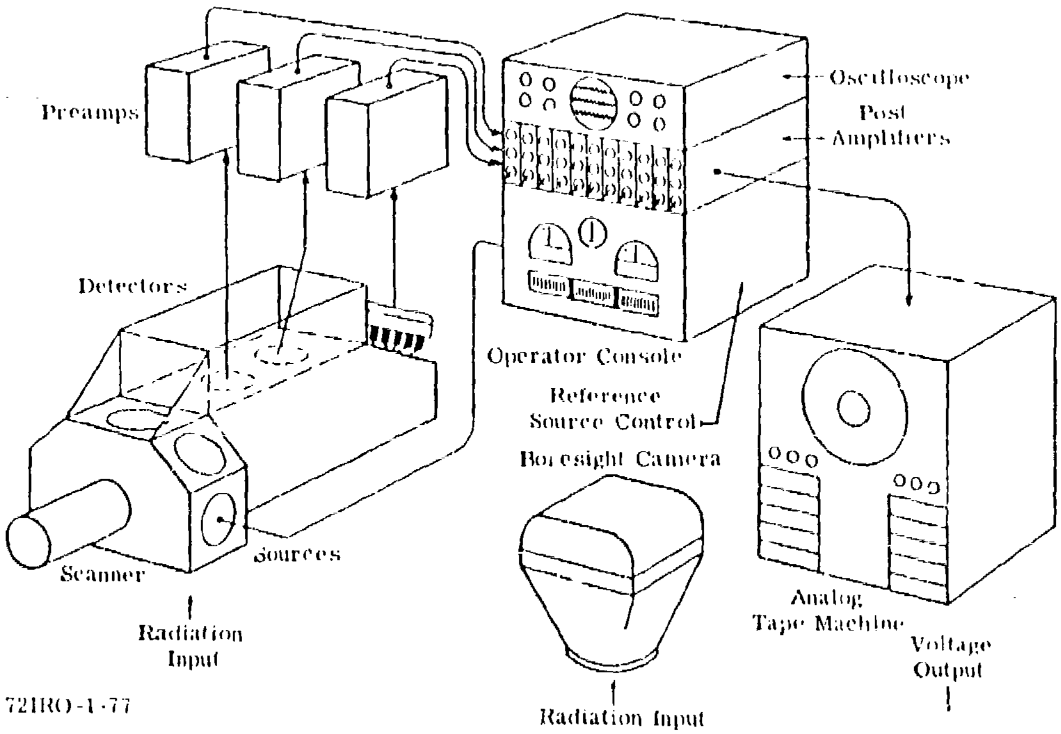


FIGURE A.6 ERIM EXPERIMENTAL MULTISPECTRAL SCANNER SYSTEM

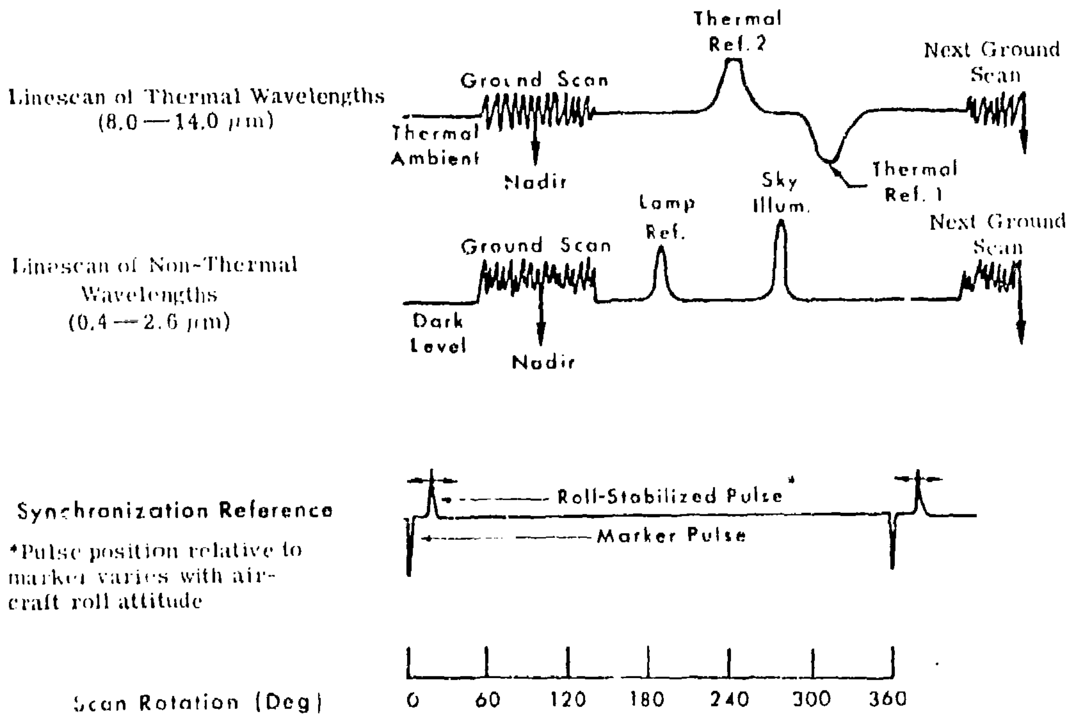


FIGURE A.7 SCANNER VOLTAGE OUTPUT VERSUS TIME

the non-thermal bands (as shown). For indexing purposes, synchronization references are generated by the scanner and recorded with the video signals. The marker pulse refers to the scan position relative to the internally mounted radiation references; the roll-stabilized pulse refers to ground scan nadir with aircraft roll motion removed.

Table A.1 lists significant parameters of the M-7 scanner system. The scanner views the terrain during 90° of its scan, providing an external field of view (FOV) ±45° from nadir. A nominal 0.1°C NEΔT and a 1% NEΔρ are achieved.* The system operates at either of two constant scan speeds -- 60 or 100 scans per second. Electronic bandwidth is limited by digital sampling. Table A.2 identifies those detector assemblies currently in use with the system. Where there is a choice of detectors, the first-listed unit is the one commonly used.

The M-5 scanner, shown schematically in Figure A.8, is a double-ended scanner using a double "axe-blade" scanning mirror to direct radiation to the two ends. In most respects it is the same as the M-7 except that the data collected from the two ends of the scanner are 90° out of phase. Two M-5 scanners in the aircraft were used to collect data. Essentially the same detector assemblies were used with the M-5 as are used with the M-7 system. One M-5 scanner was used to collect multispectral data in the visible and near infrared. Calibration lamps were added in the scanner housing which did not restrict the field-of-view below the aircraft. Another M-5 scanner was used to collect thermal data, and "hot" and "cold" graybody thermal references were added at the scanner aperture so the thermal IR channels could be calibrated. These thermal plates extended into the field of view of the scanner below the aircraft so that the video was limited to approximately ±20° from nadir.

---

*NEΔT = Noise Equivalent change in temperature.
NEΔρ = Noise Equivalent change in reflection.

TABLE A.1 M-7 SCANNER PERFORMANCE CHARACTERISTICS

12 Spectral Bands in UV, Visible and IR Regions

90° External FOV ($\pm 45°$ from nadir)

2 mrad Maximum Spatial Resolution

0.1°C Nominal Thermal Resolution

1% Nominal Reflectance Resolution

Five Radiation Reference Ports

Five-Inch Diameter Collector Optics

Scan Rate of 60 to 100 scans per second

DC to 90 kHz Electronic Bandwidth

Roll-Stabilized Imagery

TABLE A.2 DETECTOR CONFIGURATIONS FOR ERIM M-5 AND M-7 SCANNER SYSTEMS

Detector Position 1‡ (0.3 μm-15.0 μm)						Detector Position 2‡			Detector Position 3‡		
Position 1A (2.0 μm-14 μm)*			Position 1B (0.3 μm-0.7 μm)*			(1.1 μm-14 μm)*			(0.4 μm-1.1 μm)*		
Detector	Band (μm)	IFOV (mrad)	Detector	Band (μm)	IFOV (mrad)	Detector	Band (μm)	IFOV (mrad)	Detector	Band (μm)	IFOV (mrad)
HgCdTe 1-3	2.0-11.8**	3.1 × 3.1	UVPM 1-3	†	3.0 × 3.0	InAs 3-5	2.0-2.6	2.0 × 4.0	PM 9-1	0.83-1.15	2.5 × 2.5
	or						1.5-1.8	2.0 × 4.0		0.72-0.94	2.5 × 2.5
HgCdTe 1-2	2.0-15.0**	6.6 × 6.6					1.0-1.4	2.0 × 4.0		0.65-0.80	2.5 × 2.5
	or						or			0.60-0.70	2.5 × 2.5
HgCdTe 2-2	2.0**-10.9	21 × 28				InSb 3-6	2.0-2.6	2.0 × 4.0		0.55-0.64	2.5 × 2.5
	9.4-12.1	21 × 21					1.0-1.4	2.0 × 4.0		0.52-0.59	2.5 × 2.5
							or			0.49-0.55	2.5 × 2.5
	or									0.45-0.51	2.5 × 2.5
HgCdTe 3-1	2.0**-9.1	20 × 20				InAs 3-6	2.0-2.6	2.0 × 4.0		0.40-0.47	2.5 × 2.5
	8.7-10.7	20 × 20					1.5-1.8	2.0 × 4.0		or	
	9.9-14.0	20 × 20					1.0-1.4	2.0 × 4.0	PM 12-1	0.67-0.94	2 × 2
	or						or			0.62-0.70	2 × 2
HgCdTe 1-5	2.0-12.0**	3.3 × 3.3				HgCdTe 2-3	2.0-2.6	2.6 × 2.6		0.58-0.64	2 × 2
							1.0-1.8	2.6 × 2.6		0.55-0.60	2 × 2
							or			0.52-0.57	2 × 2
						InAs 1-2	1.0-2.6	3.0 × 3.0		0.50-0.54	2 × 2
							or			0.48-0.52	2 × 2
						HgCdTe 1-2	2.0-15.0	4.0 × 4.0		0.46-0.49	2 × 2
										0.41-0.48	2 × 2

Notes: *Bandpass established by replaceable dichroic mirror.

**Bandpass established by external optical filter.

†Any band between 0.3 μm and 0.7 μm may be selected by external optical filter.

‡Any one of the detectors shown may be installed in the position shown. Any 12 channels of a given configuration may be selected for FM recording on magnetic tape.

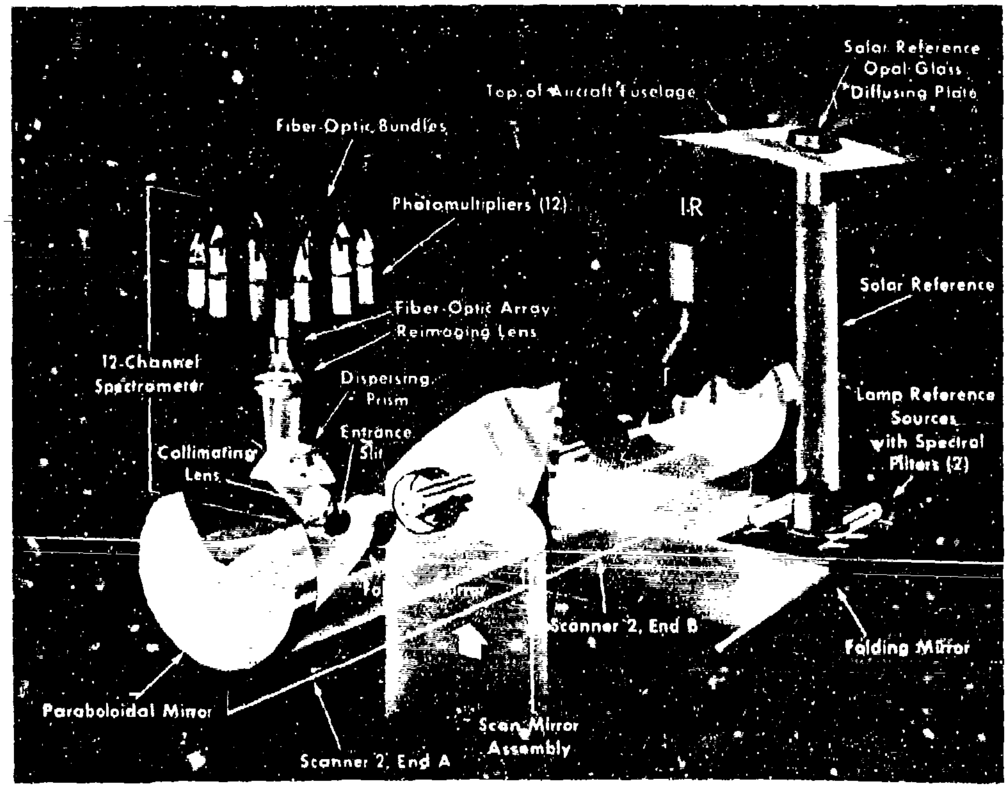


FIGURE A.8 ERIM M-5 MULTISPECTRAL SCANNER

APPENDIX B
DATA PROCESSING AND CALIBRATION

The digital multispectral scanner data selected for terrain backgrounds statistical analysis are converted to high-density digital tapes. The general preprocessing procedure used to create calibrated data tapes is discussed in Section B.1 with a detailed discussion of the procedures used for each scene being presented in Section B.2. The corrections for overlap and unequal fields of view are described in Section B.3

B.1 PREPROCESSING OF SCANNER DATA

Each data value is recorded as an eight-bit integer ranging in value from 0 to 255. Each channel (wavelength band) is recorded on a separate tape channel and the amplifier gains adjusted so that all data values usually fall in the 0-255 range with saturation occurring occasionally. The scan lines for a single M-7 scanner channel or reflective IR M-5 scanner channel consist of 790 data points of which the first 646 are scene elements (pixels) covering the range -45° to +45° with respect to nadir while the remaining 144 points are calibration values, 24 data points for each of six calculation sources. For the thermal M-5 scanner channels, the scanner elements cover pixels 162 to 484 with pixels 1-161 and 485-646 being used for the graybody thermal sources.

Before the scanner data may be used to generate scene statistics some preprocessing is required:

1. The high-density digital tapes must be converted to computer-compatible tapes.
2. Each channel must be calibrated in temperature or radiance using the calibration data at the end of each scan line.

3. Averaging was employed to reduce oversampling and to equalize any differences in the fields of view of the various detectors.

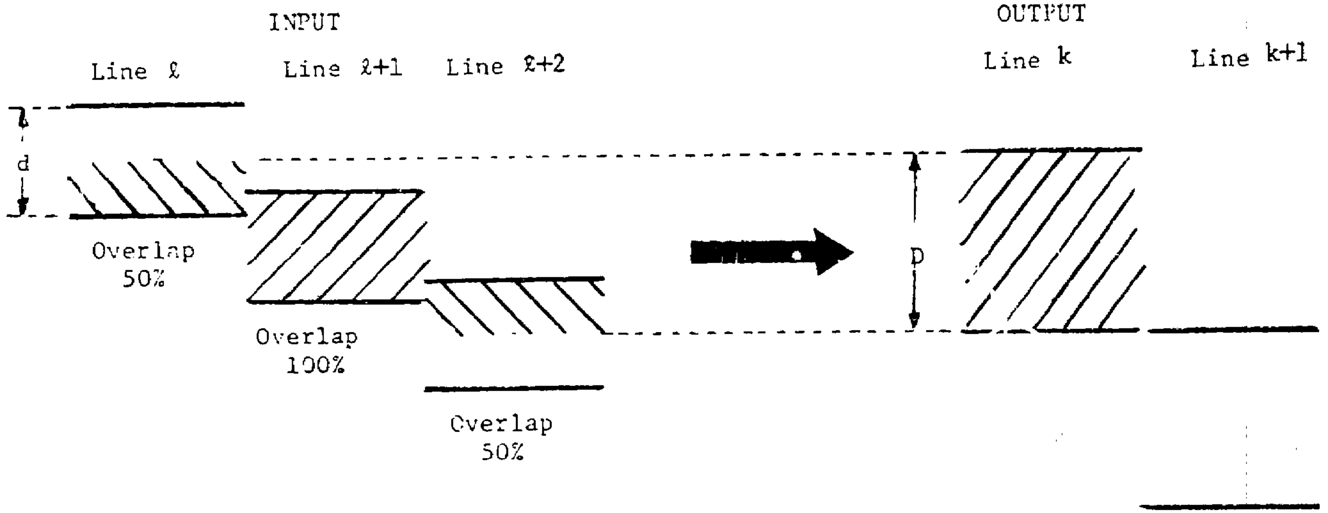
4. A set of calibrated, formatted tapes must be generated.

The first of these processes, conversion of high-density tapes to computer-compatible tapes, is accomplished using the conversion facilities at ERIM's Earth Resources Data Center. The result of this conversion process is a low-density (800 or 1600 bpi) tape for each of the scenes desired. Using these tapes, the remainder of the preprocessing (2, 3, and 4) is performed using a computer code written for the University of Michigan's AMDAHL computer system. It is the set of calibrated tapes generated from this code that is used for all image processing.

The data values appearing on the calibrated tapes are themselves integers, ranging from 0 to 255, but these integers have been modified so that a linear relationship exists between them and the apparent scene radiance or temperature. The data in the near-IR channels are converted to equivalent radiance (in $\mu W/cm^2 \cdot sr \cdot \mu m$). The equivalent radiance is the value of the spectral radiance at the center wavelength of the filter produced by a 2850 K NBS lamp source filling the sensor aperture and giving the same detector response. The data in the thermal IR channels are converted to apparent temperature in degrees Kelvin. The apparent temperature is the temperature of a blackbody filling the sensor aperture producing the same detector response. A table of apparent temperatures and their corresponding band radiances is included as Table B.1 in Section B.2. The radiance (or temperature) is recovered from the integer data values using multiplicative and additive factors recorded in the tape header record for each channel. These "mult" and "add" factors are determined from the

calibration sources appearing at the end of each scan line assuming a linear relationship between radiance and detector output (see Section B.2). For channels calibrated in radiance, the integer values on the calibrated tape differ from those on the original computer-compatible tapes by at most a zero-level correction. For channels calibrated in temperature, however, the new integers are distinctly different from the original values since those on the calibrated tape are linear in temperature while those on the original tape are proportional to radiance.

Averaging is employed to reduce oversampling and to equalize differences in the fields of view of the various detectors. The degree of oversampling is generally largest in the along-track direction because of the constant (60/sec) scan rate. The degree of oversampling in the cross-track direction is small in almost all of the data because a 3.8×10^5/sec sampling rate is used to produce a sample as large as 2.5 mr to correspond to the 2.5 mr cross-track field of view of most of the detectors. The technique that has been used for averaging lines to reduce oversampling, rather than dropping an appropriate number of alternate lines, was developed for two reasons: (1) to improve the signal-to-noise ratio in the resulting data, and (2) to equalize any differences in the along-track fields of view of the various detectors for calculating the spectral correlation coefficients. The same averaging technique can be used to reduce any overlap in the cross-track direction and to equalize any differences in the cross-track fields of view of the various detectors, but cross-track averaging was not found to be necessary in any of the data. Figure B.1 is a schematic representation of the procedure used (Section B.3). In this example, D is the largest along-track field of view of the channels and d the field of view



$$\text{Output Line } k = \{0.5\ (\text{Input Line } \ell) + 1.0\ (\text{Input Line } \ell+1) + 0.5\ (\text{Input Line } \ell+2)\}/2.0$$

FIGURE B.1 SCHEMATIC REPRESENTATION OF THE PROCEDURES USED FOR FIELD-OF-VIEW AVERAGING

of the channel being averaged. The averaging is done by summing the radiances of the scan line times their overlap with the desired output line and dividing by the sum of the overlap factors. If the scan lines for the largest field of view are themselves overlapped, non-overlapped fields of view are generated by taking as output lines those with fields of view D, each of which is displaced by D as in the right side of Figure B.1. Overlap factors are then determined in an identical manner between the original scan lines with field of view D and this set of non-overlapped output lines.

After calibration and field of view averaging, a new data tape is generated. To be compatible with existing data processing systems, this tape is written in ERIM-7094 format which consists of 36-bit words each of which contain four data values. The individual scan lines are written with the channels interleaved with 646 nine-bit data points per channel per scan line. The "mult" and "add" factors required for calibration of the data are written in the tape header record along with necessary format information. These tapes are then used directly as input to new or existing statistics generation programs.

B.2 CALIBRATION OF SCANNER DATA

As discussed in Section 3.1, output from the ERIM scanners is in the form of digital tapes in which the data values are represented by integers ranging in value from 0 to 255. At the end of each scan line a set of calibration sources is scanned and the integers observed for these sources are used to calibrate the data in apparent radiance or temperature. The resulting calibrated tape also represents the data as integers but these integers are adjusted so that they are linear in radiance or temperature and a set of multiplicative and additive factors are used to convert these integer values to the appropriate units.

The calibration sources scanned once per scan line are: controllable temperature "hot" and "cold" plates; an ambient temperature plate; a visible-near-IR lamp; an ultraviolet lamp; and a sun sensor. The visible-reflective IR channels (approximately 0.4 μm to 3.0 μm) are generally calibrated in radiance using the visible-near-IR lamp as a radiance standard and the "ambient" plate as a dark level reference. If a linear relationship is assumed between radiance and detector output, the apparent radiance of the target (the radiance observed at the scanner aperture) is given by

$$L_T^a = \left(\frac{V_T - V_A}{V_\ell - V_A}\right)(L_\ell - L_A) + L_A \tag{B-1}$$

where

V_T = The integer value observed for the target

V_A = The integer value observed for the ambient plate

V_ℓ = The integer value observed for the lamp

L_ℓ = The radiance of the lamp at the center of the bandpass of the channel to be calibrated

L_A = The ambient radiance at the center of the bandpass of the channel to be calibrated

and L_T^a is the apparent radiance of the target which is related to the actual target radiance L_T as

$$L_T^a = L_T \tau_P + L_P \tag{B-2}$$

where τ_P is transmission of the intervening path and L_P the radiance of this path.

The lamp radiance L_ℓ in Equation B-1 is obtained from a calibration of the visible-near-IR lamp using an NBS standard lamp while the ambient radiance L_A is taken as the radiance of the ambient temperature plate with emissivity ε_A given by

$$L_A = \varepsilon_A L_A^{BB} + (1 - \varepsilon_A) L_A^{BB} \tag{B-3}$$

where the first term is the radiance emitted from the plate and the second term the surrounding radiance reflected from this plate. Since the ambient temperature plate and its surroundings are at the same temperature, this equation simply gives L_A equal to L_A^{BB} or the radiance of a blackbody at ambient temperature.

Equation B-1 is then written in terms of a "mult" and an "add" factor as

$$L_T^a = V_T \cdot \text{MULT} + \text{ADD} \tag{B-4}$$

where

$$\text{MULT} = W$$

$$\text{ADD} = L_A^{BB} - WV_A$$

and

$$W = (L_\ell - L_A^{BB})/(V_\ell - V_A) \tag{B-5}$$

The computer program used for calibration initially averages the integer values (bin values) of the calibration sources for all scan lines in the image and outputs a mean and a standard deviation for them. If the standard deviations are small compared to the mean values the program allows for an "average" calibration in which the mean bin values of V_ℓ and V_A are used in Equations B-4 and B-5. In this case the integer data values on the calibrated tape are the same as those in the original

tape; only "mult" and "add" factors are evaluated by the calibration procedure. However, if the standard deviations are not small compared to the means, indicating a drift in the system, a "line-by-line" calibration is required. For this type of calibration values of V_ℓ and V_A are taken from the calibration sources at the end of each scan line and these values used to determine "mult" and "add" factors from Equation B-5. These factors are then used to modify the integer data values of a given scan line so that only one "mult" and "add" factor is required for the total image. The single "mult" and "add" factors used are those determined from the mean V_ℓ, V_A values and the modified integer data value is taken as

$$V_T' = \frac{V_T \cdot \text{MULT} + \text{ADD} - \overline{\text{ADD}}}{\overline{\text{MULT}}} \qquad \text{(B-6)}$$

where the average factors are $\overline{\text{MULT}}$ and $\overline{\text{ADD}}$, those determined for each line are MULT and ADD, and V_T' is the modified integer data value.

The long wavelength IR channels ($\lambda > 3.0$ μm) are calibrated in temperature and require a somewhat more involved calibration procedure. Since the detector output is proportional to radiance and not temperature, the first step in the process is to relate bin value (integer data value) to radiance, as in the reflective IR channels, using the "cold" plate as a dark level reference, the "hot" plate as a radiance standard, and the "ambient" plate to correct for ambient radiation levels. If a linear relationship is again assumed between detector output and radiance the apparent target radiance is given by an equation identical to (B-1) except that the ambient radiance (L_A) and bin value (V_A) are replaced by those for the "cold" plate (L_C, V_C) and the lamp radiance (L_ℓ) and bin value (V_ℓ) are replaced by those for the "hot" plate (L_H, V_H):

$$L_T^a = L_C + \left(\frac{V_T - V_C}{V_H - V_C}\right)(L_H - L_C) \tag{B-7}$$

In this case however the "hot" plate radiance is given by

$$L_H = \epsilon_H L_H^{BB} + (1 - \epsilon_H)\, L_A^{BB} \tag{B-8}$$

where ϵ_H is the emissivity of the "hot" plate, L_H^{BB} the radiance of a blackbody at the same temperature as the "hot" plate, and L_A^{BB} the ambient blackbody radiance. Similarly, the "cold" plate radiance is given by

$$L_C = \epsilon_C L_C^{BB} + (1 - \epsilon_C)\, L_A^{BB} \tag{B-9}$$

In both of these expressions the first term is the radiance emitted by the plate while the second term is the ambient radiance reflected by the plate.

Substitution of Equations B-8 and B-9 into (B-7) and taking the plate emissivities equal gives

$$L_T^a = \left[\epsilon L_C^{BB} + (1 - \epsilon)\, L_A^{BB}\right] + \left(\frac{V_T - V_C}{V_H - V_C}\right)\left[\epsilon\,(L_H^{BB} - L_C^{BB})\right] \tag{B-10}$$

This equation could be used for calibration but the ambient radiance L_A^{BB} would have to be calculated from ambient temperature measurements. This may be avoided by again assuming linearity of the detectors and taking

$$L_A^{BB} = L_C + \left(\frac{V_A - V_C}{V_H - V_C}\right)(L_H - L_C) \tag{B-11}$$

as for L_T^a in Equation B-7. Substituting Equations B-8 and B-9 into this expression it is found that many of the terms cancel and the ambient

radiance is given by

$$L_A^{BB} = L_C^{BB} + \left(\frac{V_A - V_C}{V_H - V_C}\right) \left(L_H^{BB} - L_C^{BB}\right) \tag{B-12}$$

where all radiances are now blackbody radiances evaluated at the plate temperatures. Making a final substitution of Equation B-12 into Equation B-10 and rearranging terms gives

$$L_T^a = L_C^{BB} + W\ [(1 - \varepsilon)V_A - V_C] + \varepsilon W V_T \tag{B-13}$$

where

$$W = \left(\frac{L_H^{BB} - L_C^{BB}}{V_H - V_C}\right) \tag{B-14}$$

Equation B-13 then relates the data bin values (V_T) to radiance and a second transformation is required to convert these values to temperature.

The computations required to convert radiance to temperature have been minimized by noting that the radiance values are bounded; the minimum value being given by $V_T = 0$ and the maximum by $V_T = 255$. Using this fact, a table of temperature versus radiance is constructed, as shown in Table B.1, by integrating the Planck function over the bandpass of the channel to be calibrated choosing a range of temperatures sufficient to cover the entire radiance range. The temperature increments in this table are taken small enough ($\sim$1°C) so that interpolation may be used to form an array of temperature versus data bin value $T(V_T)$ for all possible bin values. It is this array which is then used to directly convert the uncalibrated data values to temperature.

Unlike the radiance data, the integer values appearing in the calibrated images for the thermal channels are never the same as those of the original image since the calibrated values are now proportional to temperature not radiance. This new set of integer data values is scaled from 0 to 255 using

TABLE B.1a RADIANCE FROM 3.0 - 4.2 MICRONS IN MICROWATTS/(cm^2 . sr)

Radiance	Apparent Temperature °K
0.65034E+01	259
0.72623E+01	261
0.80966E+01	263
0.90126E+01	265
0.10017E+02	267
0.11116E+02	269
0.12318E+02	271
0.13629E+02	273
0.15060E+02	275
0.16617E+02	277
0.18310E+02	279
0.20150E+02	281
0.22145E+02	283
0.24307E+02	285
0.26647E+02	287
0.29176E+02	289
0.31908E+02	291
0.34854E+02	293
0.38028E+02	295
0.41445E+02	297
0.45119E+02	299
0.49065E+02	301
0.53300E+02	303
0.57840E+02	305
0.62703E+02	307
0.67906E+02	309
0.73469E+02	311
0.79410E+02	313
0.85751E+02	315
0.92512E+02	317
0.99715E+02	319
0.10738E+03	321
0.11554E+03	323
0.12421E+03	325
0.13341E+03	327
0.14318E+03	329
0.15353E+03	331

TABLE B.1b RADIANCE FROM 3.5 - 3.9 MICRONS IN MICROWATTS/cm^2 · sr)

Radiance	Apparent Temperature °K
0.21479E+01	259
0.24074E+01	261
0.26937E+01	263
0.30089E+01	265
0.33555E+01	267
0.37360E+01	269
0.41531E+01	271
0.46096E+01	273
0.51087E+01	275
0.56534E+01	277
0.62472E+01	279
0.68935E+01	281
0.75963E+01	283
0.83594E+01	285
0.91869E+01	287
0.10083E+02	289
0.11053E+02	291
0.12101E+02	293
0.13232E+02	295
0.14452E+02	297
0.15765E+02	299
0.17178E+02	301
0.18697E+02	303
0.20327E+02	305
0.22076E+02	307
0.23950E+02	309
0.25955E+02	311
0.28100E+02	313
0.30392E+02	315
0.32838E+02	317
0.35448E+02	319
0.38228E+02	321
0.41187E+02	323
0.44336E+02	325
0.47682E+02	327
0.51236E+02	329
0.55007E+02	331

TABLE B.1c RADIANCE FROM 4.5 - 5.5 MICRONS IN MICROWATTS/(cm^2 · sr)

Radiance	Apparent Temperature °K
1.1129E+02	275
1.1553E+02	276
1.1989E+02	277
1.2439E+02	278
1.2903E+02	279
1.3380E+02	280
1.3872E+02	281
1.4378E+02	282
1.4898E+02	283
1.5434E+02	284
1.5985E+02	285
1.6552E+02	286
1.7135E+02	287
1.7734E+02	288
1.8349E+02	289
1.8982E+02	290
1.9632E+02	291
2.0300E+02	292
2.0985E+02	293
2.1689E+02	294
2.2412E+02	295
2.3154E+02	296
2.3915E+02	297
2.4696E+02	298
2.5496E+02	299
2.6318E+02	300
2.7160E+02	301
2.8023E+02	302
2.8908E+02	303
2.9815E+02	304
3.0744E+02	305
3.1696E+02	306
3.2671E+02	307
3.3670E+02	308
3.4692E+02	309
3.5739E+02	310
3.6810E+02	311
3.7906E+02	312
3.9028E+02	313

TABLE B.1c (Continued)

Radiance	Apparent Temperature °K
4.0175E+02	314
4.1349E+02	315
4.2549E+02	316
4.3777E+02	317
4.5032E+02	318
4.6315E+02	319
4.7626E+02	320
4.8966E+02	321
5.0335E+02	322
5.1733E+02	323
5.3162E+02	324
5.4621E+02	325

TABLE B.1d RADIANCE FROM 8.0 - 13.5 MICRONS IN MICROWATTS/(cm^2 · sr)

Radiance	Apparent Temperature °K
3.3578E+03	275
3.4194E+03	276
3.4816E+03	277
3.5445E+03	278
3.6081E+03	279
3.6725E+03	280
3.7375E+03	281
3.8033E+03	282
3.8697E+03	283
3.9369E+03	284
4.0048E+03	285
4.0734E+03	286
4.1428E+03	287
4.2128E+03	288
4.2836E+03	289
4.3551E+03	290
4.4274E+03	291
4.5003E+03	292
4.5740E+03	293
4.6484E+03	294
4.7236E+03	295
4.7995E+03	296
4.8761E+03	297
4.9534E+03	298
5.0315E+03	299
5.1103E+03	300
5.1899E+03	301
5.2702E+03	302
5.3512E+03	303
5.4330E+03	304
5.5155E+03	305
5.5987E+03	306
5.6827E+03	307
5.7675E+03	308
5.8529E+03	309
5.9391E+03	310
6.0261E+03	311
6.1138E+03	312
6.2023E+03	313

TABLE B.1d (Continued)

Radiance	Apparent Temperature °K
6.2915E+03	314
6.3814E+03	315
6.4721E+03	316
6.5636E+03	317
6.6557E+03	318
6.7487E+03	319
6.8424E+03	320
6.9368E+03	321
7.0320E+03	322
7.1279E+03	323
7.2246E+03	324
7.3220E+03	325

TABLE B.1e RADIANCE FROM 8.0 - 14.0 MICRONS IN MICROWATTS/(cm^2 · sr)

Radiance	Apparent Temperature °K
0.30190E+04	265
0.30773E+04	266
0.31362E+04	267
0.31959E+04	268
0.32562E+04	269
0.33173E+04	270
0.33792E+04	271
0.34417E+04	272
0.35049E+04	273
0.35689E+04	274
0.36336E+04	275
0.36990E+04	276
0.37652E+04	277
0.38321E+04	278
0.38997E+04	279
0.39681E+04	280
0.40372E+04	281
0.41070E+04	282
0.41776E+04	283
0.42490E+04	284
0.43210E+04	285
0.43938E+04	286
0.44674E+04	287
0.45417E+04	288
0.46168E+04	289
0.46926E+04	290
0.47691E+04	291
0.48465E+04	292
0.49245E+04	293
0.50034E+04	294
0.50829E+04	295
0.51633E+04	296
0.52444E+04	297
0.53263E+04	298
0.54089E+04	299
0.54923E+04	300
0.55764E+04	301
0.56613E+04	302
0.57470E+04	303

TABLE B.1e (Continued)

Radiance	Apparent Temperature °K
0.58334E+04	304
0.59206E+04	305
0.60086E+04	306
0.60974E+04	307
0.61869E+04	308
0.62772E+04	309
0.63682E+04	310
0.64600E+04	311
0.65526E+04	312
0.66460E+04	313
0.67401E+04	314
0.68350E+04	315
0.69306E+04	316
0.70271E+04	317
0.71243E+04	318
0.72223E+04	319
0.73210E+04	320

TABLE B.1f RADIANCE FROM 9.0 - 11.4 MICRONS IN MICROWATTS/(cm^2 · sr)

Radiance	Apparent Temperature °K
0.14113E+04	271
0.14388E+04	272
0.14667E+04	273
0.14949E+04	274
0.15234E+04	275
0.15522E+04	276
0.15815E+04	277
0.16110E+04	278
0.16409E+04	279
0.16711E+04	280
0.17017E+04	281
0.17326E+04	282
0.17638E+04	283
0.17954E+04	284
0.18273E+04	285
0.18596E+04	286
0.18922E+04	287
0.19252E+04	288
0.19585E+04	289
0.19922E+04	290
0.20262E+04	291
0.20606E+04	292
0.20953E+04	293
0.21304E+04	294
0.21658E+04	295
0.22016E+04	296
0.22377E+04	297
0.22742E+04	298
0.23110E+04	299
0.23482E+04	300
0.23857E+04	301
0.24236E+04	302
0.24618E+04	303
0.25004E+04	304
0.25393E+04	305
0.25786E+04	306
0.26183E+04	307
0.26583E+04	308
0.26987E+04	309
0.27394E+04	310
0.27804E+04	311

TABLE B.1f (Continued)

Radiance	Apparent Temperature °K
0.28219E+04	312
0.28637E+04	313
0.29058E+04	314
0.29483E+04	315
0.29912E+04	316
0.30344E+04	317
0.30779E+04	318
0.31219E+04	319
0.31661E+04	320
0.32108E+04	321
0.32558E+04	322
0.33011E+04	323
0.33468E+04	324
0.33929E+04	325
0.34393E+04	326
0.34861E+04	327
0.35332E+04	328
0.35807E+04	329
0.36286E+04	330

TABLE B.1g RADIANCE FROM 9.3 - 11.7 MICRONS IN MICROWATTS/($cm^2 \cdot sr$)

Radiance	Apparent Temperature °K
1.5292E+03	275
1.5574E+03	276
1.5859E+03	277
1.6147E+03	278
1.6438E+03	279
1.6733E+03	280
1.7030E+03	281
1.7331E+03	282
1.7635E+03	283
1.7942E+03	284
1.8253E+03	285
1.8566E+03	286
1.8883E+03	287
1.9203E+03	288
1.9526E+03	289
1.9853E+03	290
2.0182E+03	291
2.0515E+03	292
2.0852E+03	293
2.1191E+03	294
2.1534E+03	295
2.1879E+03	296
2.2229E+03	297
2.2581E+03	298
2.2937E+03	299
2.3296E+03	300
2.3658E+03	301
2.4023E+03	302
2.4392E+03	303
2.4764E+03	304
2.5139E+03	305
2.5517E+03	306
2.5899E+03	307
2.6284E+03	308
2.6672E+03	309
2.7064E+03	310
2.7459E+03	311
2.7857E+03	312
2.8258E+03	313

TABLE B.1g (Continued)

Radiance	Apparent Temperature °K
2.8663E+03	314
2.9070E+03	315
2.9482E+03	316
2.9896E+03	317
3.0314E+03	318
3.0734E+03	319
3.1159E+03	320
3.1586E+03	321
3.2017E+03	322
3.2450E+03	323
3.2888E+03	324
3.3328E+03	325

$$N = \frac{T(V_T) - T(0)}{T(255) - T(0)} \; 255 \qquad \text{(B-15)}$$

where T is the temperature versus bin value array with $T(V_T)$ equal to the temperature corresponding to bin value V_T. The "mult" and "add" factors for the thermal channels are then taken as

$$\text{MULT} = \frac{T(255) - T(0)}{255}$$

$$\text{(B-16)}$$

$$\text{ADD} = T(0)$$

The calibration program allows for "average" or "line-by-line" calibration of the thermal channels as it did for the reflective IR channels. Because of the amount of computation required to set up the temperature versus bin value array, only one such array is generated using the scene average values of V_C, V_A, and V_H in Equation B-13. If an "average" calibration is used this array directly relates data bin values (V_T) to temperature and Equation B-15 is used directly. However, if a "line-by-line" calibration is required the data bin values must be modified so that B-13, using scene average values of V_C, V_A, and V_H, gives the correct radiance. The modification of the data bin values is done in the same way as for the reflective IR channels using Equation B-6. In this case, the "mult" factors are given by εW or $\varepsilon\bar{W}$ and the "add" factors by the first two terms of Equation 4-13 or

$$\text{ADD} = L_C^{BB} + W\,[(1 - \varepsilon)\,V_A - V_C]$$

$$\overline{\text{ADD}} = L_C^{BB} + \bar{W}\,[(1 - \varepsilon)\,\bar{V}_A - \bar{V}_C]$$

To avoid round-off errors the values determined from B-6 are not rounded to the nearest integer but taken as floating point numbers and interpolation in the $T(V_i)$ array is used to determine the temperature. This temperature is then used in place of $T(V_i)$ in Equation B-15 to evaluate the calibrated integer value.

In a typical data set both thermal and reflective IR channels are present so that both of the above procedures are used in generating a calibrated image tape.

B.3 CORRECTIONS FOR OVERLAP AND UNEQUAL FIELDS OF VIEW

Since the detectors used in the various channels (wavelength regions) vary in size and consequently in instantaneous field of view, direct comparisons of the channels is not possible unless the fields of view are normalized in some fashion. A second, although less critical, problem is that depending on the aircraft altitude, scan lines and/or pixels may be highly overlapped resulting in oversampling of the scene. Both of these problems were corrected at the time the data was calibrated by averaging the scan lines (and/or pixels) of the smaller field-of-view channels and generating an equivalent scan line (and/or pixel) with a field of view equal to the largest field of view. This procedure must be carried out separately for scan lines and pixels within a scan line since the fields of view and the data taking rates are different in these two dimensions. In the following discussion only scan line averaging will be discussed since pixel averaging is completely analogous.

As outlined in Section B.1, the averaging procedure consists of setting up a set of contiguous output lines with a field of view equal to the largest field of view (D) and then combining the smaller field-of-view (d) scan lines to generate equivalent lines with fields of view D. As shown in Figure B.1, the combining of scan lines is accomplished using a weighted average given by

$$V_k = \frac{\sum_{\ell} F_{k,\ell} V_{\ell}}{\sum_{\ell} F_{k,\ell}} \qquad \text{(B-17)}$$

where V_k is the k^{th} <u>output</u> line data value for a given pixel, V_ℓ the ℓ^{th} <u>input</u> line data value for the same pixel, and $F_{k,\ell}$ the overlap between input line ℓ and output line k. Since the overlap will be non-zero only for a small number of lines about the output line, $F_{k,\ell}$ need only be calculated for a few values of ℓ. A general expression for the

overlap is determined by considering the displacements of the scan lines from the beginning of the scene. The displacement to the bottom of input scan line ℓ is given by

$$(\ell - 1)\, v_a \tau + \frac{(D + d)}{2} \qquad \text{(B-18)}$$

where v_a is the aircraft ground velocity and τ the scan period. The second term in this equation is included since the smaller field of view (d) is concentric with D in scan line 1 and consequently has an initial displacement (to the bottom of the scan line) given by

$$D - \frac{(D - d)}{2} = \frac{(D + d)}{2} \qquad \text{(B-19)}$$

As shown in Figure B.2, the overlap between input line ℓ and output line k is then given by

$$\gamma = (\ell - 1) v_a \tau + \frac{(D + d)}{2} - (k - 1)D \qquad \text{(B-20)}$$

so that the percent overlap (γ/d) or overlap factor $F_{k,\ell}$ is

$$F_{k,\ell} = \frac{1}{2}\left[1 + \frac{D}{d}\right] - \frac{1}{d}\left|(k - 1)D - (\ell - 1)\, v_a \tau\right| \qquad \text{(B-21)}$$

with the constraints

$$F_{k,\ell} \rightarrow 1 \text{ if } F_{k,\ell} \geq 1$$

$$F_{k,\ell} \rightarrow 0 \text{ if } F_{k,\ell} \leq 0$$

The absolute value appears in this equation to account for cases where the bottom of the input line has a greater displacement than that of the output line. It may be seen that the relationship between k and ℓ is

$$(k - 1) = \text{Integer Value of } \left[(\ell - 1)\frac{V_a \tau}{D}\right] \qquad \text{(B-22)}$$

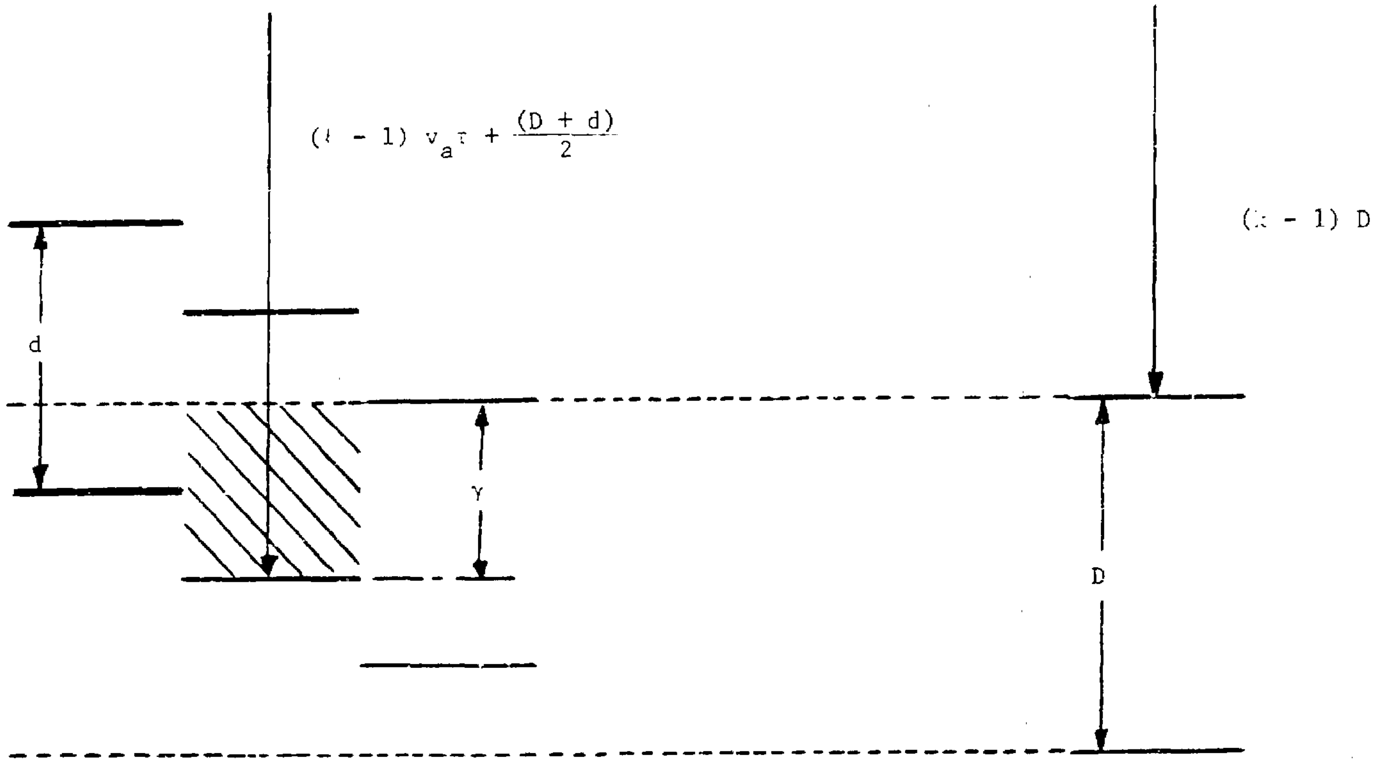


FIGURE B.2 SCHEMATIC OF DISPLACEMENTS USED TO DERIVE THE OVERLAP FACTORS $F_{k,\ell}$

These overlap factors are then used in Equation B-17 to generate the equivalent output lines. Since in general the scan lines for the largest field-of-view channel are themselves overlapped, this procedure is used to average these lines as well so that a contiguous set of output lines is obtained in all channels. In this case, the same equations are used but d is equal to D.

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GLOSSARY

HUM1 or HUME1 – Overall Port Hueneme, CA Scene

HUM2 or HUME2 – Specific region of Port Hueneme, CA area exhibiting sun glint on water

IFOV – Instantaneous Field of View

NEVB, NEVF, NEVG1 or NVG1, NEVI, NEVM, NEVN – Mountainous Terrain Scene from Nellis AFB, NV

NEVC or NEVC1, NEVH1 or NVH1, NEVL – Desert Terrain Scene from Nellis AFB, NV

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